BUILT TO LAST:

Designing for a Referential Continuity in the Built Environment

by Susan C. Dunbar

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June 1991

Signature of the Author_____

Susan C. Dunbar
Department of Architecture
May 10, 1991

Certified by_____

Renee Chow
Lecturer
Thesis Supervisor

Accepted by_____

Julian Wampler
Chairman
Department Committee for Graduate Students

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Using
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to find or define the proceSs
you're abouT to be involved in
the questions you'll Ask
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whiCh manages so well
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an arM
divide the work to be done into partS
and the Time
Available
iNto an equal number
then you Can
procEed giving equal attention
to each of the partS

–JOHN CAGE

ACKNOWLEDGEMENTS

Thankyou to . . .

Renee Chow for keeping me on track and in line with your patience and example and for making this a shared exploration.

Imre Halasz for the discussions about architecture, philosophy, life, glasses . . . , and for trusting me to choose my own way.

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Thankyou to Childs, Bertman, Tseckares, and Casendino Inc., and specifically John Cretecos for providing me with the working drawings of Berkley and the Marborough.

And finally, because I love you very much, this thesis is dedicated to . . .

MY FAMILY.

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ABSTRACT

This thesis is about exploring a way of understanding, designing and building architecture which acknowledges that we are a part of a world which is always changing and becoming, without denying or forgetting the past, and still fulfilling the needs and potentials of the present. It is about continuing the collective understanding of how we relate to an evolving built environment. Current trends in commercial architecture tend to build neutral spaces which are then sold as a commodity to be filled with whatever use the consumer desires, rather than building for specific needs as they are required. This has contributed to a lack of definition in the cumulative built environment which has reduced the information available as a reference for evaluating and interpreting one's surroundings in ways which enrich and further its potential use.

What I am proposing to explore are some issues of design that respond to a specific site, which will be able to meet the long-term concerns of growth and/or change in use and technology, while providing a referential continuity; a continuity in the understanding of how a building and its surroundings have evolved. As change is an inevitable fact of existence, designing with that as a goal is redundant and leads only to an undefined, passive building as opposed to a more specific definition which positively influences how it is inhabited. The analysis of existing buildings which have been renovated generates some basic principles about the qualities which seem to endow a structure with the capacity to be reinterpreted without losing its initial character in the existing environment. These principles will then be applied to the design of a new building as an illustration of how buildings which are not designed for the possibility of multiple inhabitations over time, need not be neutral in their organization, but may actually contribute substantially to their surroundings and their interpretation.

Thesis Supervisor: Renee Chow
Title: Lecturer

Thesis Critics: Imre Halasz, Thomas Chastain

Time present and time past
Are both perhaps present in time future,
And time future contained in time past.
If all time is eternally present
All time is unredeemable.
What might have been is an abstraction
Remaining a perpetual possibility
Only in a world of speculation.
What might have been and what has been
Point to one end, which is always present.
Footfalls echo in the memory
Down the passage which we did not take
Towards the door we never opened
Into the rose-garden. My words echo
Thus, in your mind.
But to what purpose
Disturbing the dust on a bowl of rose-leaves
I do not know.
Other echoes
Inhabit the garden. Shall we follow?
Quick, said the bird, find them, find them,
Round the corner. Through the first gate,
Into our first world, shall we follow
The deception of the thrush? Into our first world.
There they were, dignified, invisible, Moving without
pressure, over the dead leaves, In the autumn heat,
through the vibrant air
And the bird called, in response to
The unheard music hidden in the shrubbery,
And the unseen eyebeam crossed, for the roses
Had the look of flowers that are looked at.
There they were as our guests, accepted and accepting.
So we moved, and they, in a formal pattern,
Along the empty alley, into the box circle,
To look down into the drained pool.
Dry the pool, dry concrete, brown edged,
And the pool was filled with water out of sunlight,
And the lotos rose, quietly, quietly,
The surface glittered out of heart of light,
And they were behind us, reflected in the pool.
Then a cloud passed, and the pool was empty.
Go, said the bird, for the leaves were full of children,
Hidden excitedly, containing laughter.
Go, go, go, said the bird: human kind
Cannot bear very much reality.
Time past and time future
What might have been and what has been
Point to one end, which is always present.

T. S. Eliot, Four Quartets, "Burnt Norton", Part I

"... it means that the perception of time tends, through periods of unbroken uniformity, to fall away; the perception of time, so closely bound up with the consciousness of life that the one may not be weakened without the other suffering a sensible impairment."

Thomas Mann, The Magic Mountain

How does architecture record the passage of time?

A great deal of effort has been expended on defining "time" and how it could be expressed, planned for and used to enhance the design of a building. Books were read, philosophical discussions had, poetry recited . . . all well, fine and very interesting, but not very architectural. One fact that did stand out was that the physical manifestation of time was change. Therefore, it was the awareness of change which allowed the passage of time to be noted.

The next search then became just how to go about expressing and allowing for change in the built environment. In general the best way to reveal a specific quality is to also introduce the presence of its "opposite". Dark reveals light, cold reveals heat, short reveals tall and therefore one would think that permanence reveals change and thus the passage of time. In order to understand and evaluate change there must be something that has not changed to which it can be compared. True, change can be perceived initially without comparison to a constant , but this is because memory provides that constant. A more physical record is necessary if this change is to be evaluated and appreciated beyond the limits of that memory. For example, if this information is to be passed on from neighbor to neighbor, culture to culture, or generation to generation.

"Dogs still can't even swim underwater, although they have had a million years in which to learn. They goof around as much as ever. They can't even catch fish yet. And I would have to say that the whole rest of the whole animal world has done strikingly little to improve its survival tactics in all that time, except for man."

Kurt Vonnegut, Galapogos

Architecture is the result of a cultural decision that a building should be more than four walls and a roof. In societies where buildings are built purely to meet the immediate needs of shelter and protection there are no architects. In fact the world got on just fine for quite some time without them. So, there must be something that they provide that civilization thinks is valuable, beyond the bare minimum necessary to survive. That contribution is the ability to employ many of the accomplishments of a culture in the generation of a physical artifact. An architect combines a knowledge of technologies, lifestyles, economics, and to some extent art and philosophy to produce a building. In this way, therefore, architecture relays information about a civilization's accomplishments in a variety of disciplines.

Environments which have many temporal layers are very rich. We as human beings tend to be fond of them because these are the places that are familiar and show how we have intervened over time in our world. (Whether that intervention has been for the good or the bad is another thesis.) What makes history (the recorded version of "the facts" about the past) so interesting and important to societies is that it allows people to measure their progress, their evolution. Without this evaluation, change will occur for its own sake and new interventions will only be different rather than deliberate choices made with a desire to progress from what was. Architectural interventions in an existing environment, built or unbuilt, provide an opportunity for a culture to add their layer to the

continuing understanding of the "progress" in a multifaceted and potentially durable fashion. A new building would then be generated from a *critical* understanding of what already existed in the surrounding conditions while employing the technical, social, and physical understandings of the present. This also would include an acknowledgement of the fact that at some point in the future it may be reinterpreted for the changing needs of that time.

A concern grew from this investigation that many of the current buildings being constructed were not "permanent" enough to remain as a"record" of the current society's contributions in the continuing built environment. As space becomes a commodity that is produced in quantity before its use is designated, the concern for "flexibility" has encouraged the generation of neutral spaces in which "anything" can happen and upon which any icon of use can be hung. In this way, we are buying and borrowing our culture rather than making it and "owning" it for ourselves. This situation occurs because of the assumption that the more physical definition there is, the more limited the possibilities are. While the number of possibilities might be greater in such an environment, the number that are actually considered remains the same, and those possibilities which are actually produced are not as rich as those produced in a more densely physical environment. This is because a potential inhabitant, in general, is not interested in expending tremendous effort or expense on the design of a given space, especially in these days when the occupant is rarely the owner. The user

therefore, will make the minimum intervention necessary to render a space usable. Thus, when one starts with less, one will end up with less, and this means that the building contributes little or nothing to the ongoing built environment.

This thesis is an attempt to explore what the more durable qualities of a building are that allow them to be reused over time without losing their identity as the contribution of a specific time and place. This information could then be applied to the design of a new building within an existing built environment. The goal is that the decisions will be particular and directive without being so restrictive that the building will not be able to out live its initial use and continue the temporal and physical layering of its environment.

Dr. Robbins had spotted Dr. Goldman at the French doors again. "What is the Chink's clockworks like?" he asked.

"Ha ha," laughed Sissy. "Crimineу. You wouldn't believe it. It's just a bunch of junk. Garbage can lids and old saucepans and lard tins and car fenders, all wired together way down in the middle of the Siwash cave. Every now and then, this contraption moves - a bat will fly into it, a rock will fall on it, and updraft will catch it, a wire will rust through, or it'll just move for no apparently logical reason - and one part of it will hit against another part. And it'll go bonk *or* poing *and that* bonk *or that* poing *five times in a row. Then a pause; then one more time. After that, it might be silent for a day or two, maybe a month. Then the clock'll strike again, say twice. Following that there could be silence for an entire year - or just a minute or so. Then,* POING! *so loud you nearly jump out of your skin. And that's the way it goes. Striking freely, crazily, at odd intervals."*

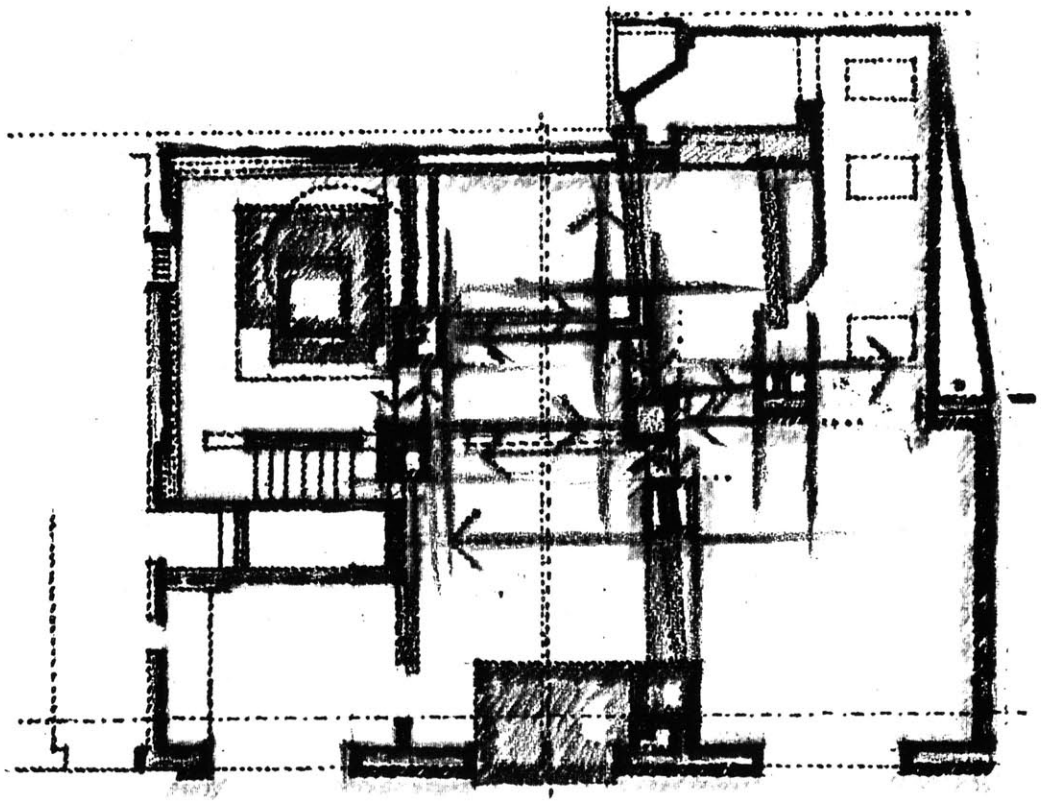
Sissy closed her eyes, as if listening for the distant bonk or poing, and Dr. Robbins, ignoring Dr. Goldman's gestures from the French doors, seemed to be listening to.

They listened. they heard.

They were assured then, together, the psychiatric intern and his patient, that there was a rhythm, a strange unnoted rhythm, that might or might not be beating out their lives for them. For each of us.

Because to measure time by the clockworks is to know that you are moving toward some end . . . but at a pace far different from the one you might think!"

Tom Robbins, <u>*Even Cowgirls Get the Blues*</u>



How then does one generate a strong built environment and still allow for a level of interpretation by the occupant?

A series of diagrams were generated for two existing buildings which had been recently renovated in the Back Bay in Boston, Massachusetts, in order to determine what qualities remained constant or determinant in the reinhabitation of the building. The diagrams researched how the range and relative size of dimensions found in the original structures were influential in determining the sizes of the inhabitations, what the scale and type of uses in the surrounding buildings were, how the hierarchy of public to private and the movement within the building determined its organization, how the spatial organizers informed the inhabitation, and whether the structure/construction was a limiting factor in the reinterpretation of the space.

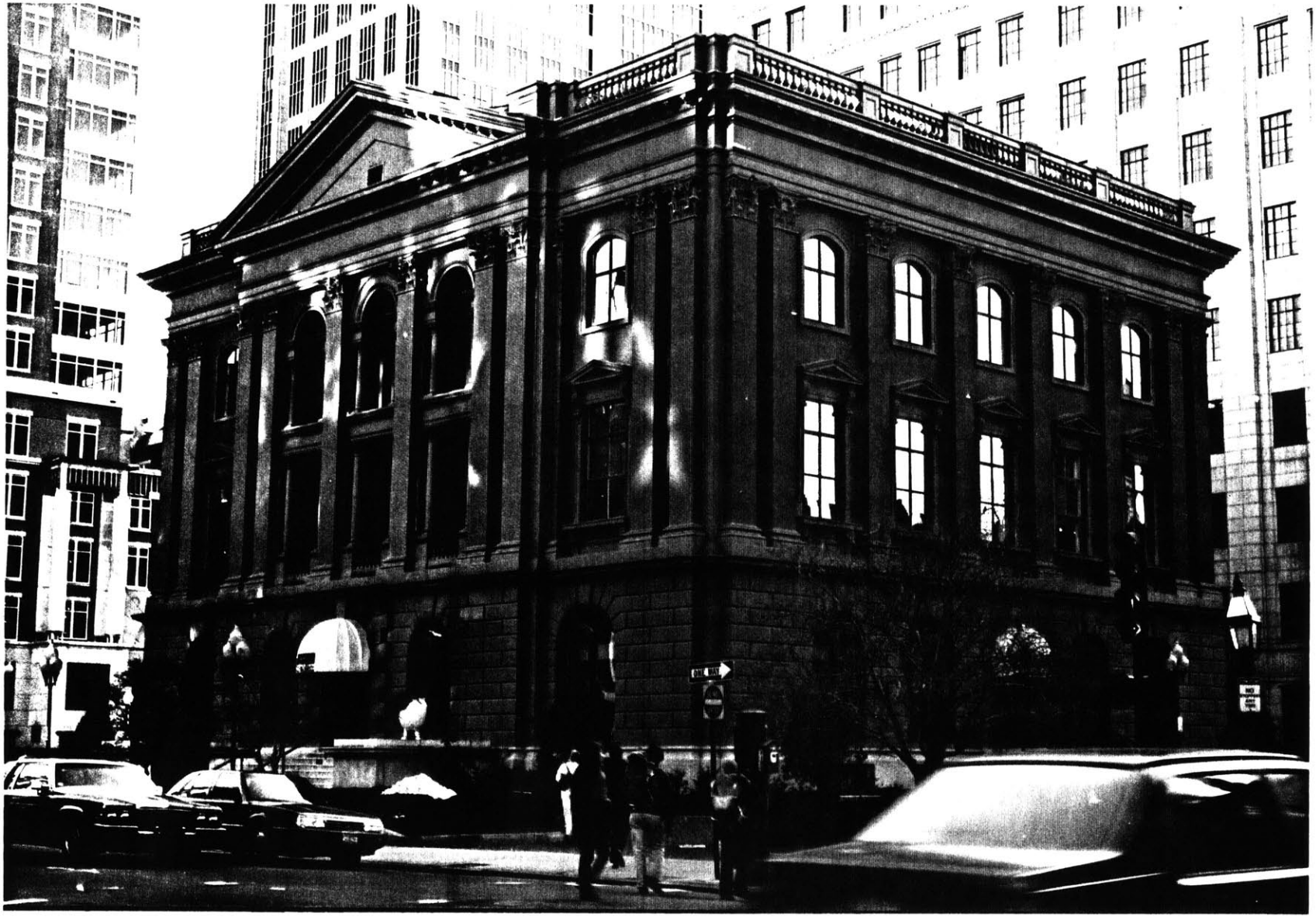
	DIMENSION	*LOCATION*	*ACCESS*	*SPATIAL ORGANIZERS*	*STRUCTURE CONSTRUCTION*
DISTRICT	**•Establishes dimensional relationships beyond size of building.**	**•Surrounding uses •Environment (sun, wind, earthquakes, etc.)**			
NEIGHBORHOOD	**•Sizes in building determined by those found in surrounding environment (ie. height, set backs)**	**•Unique qualities of the site (slope relationship to adjacent buildings).**	**•Entry to building •Relationship of street to public /private spaces of building).**	•How building is located by or informs location of surrounding built environment.	
BUILDING	**•Sizes determined by structure and intended use or organization**		•Establishes main zone of access in building. •Public territories in relation to privacies.	**•How vertical spaces inform organization (courtyards, vertical access, mechanical stacks).**	
USE	**•Sizes which allow inhabitation and interaction.**				**•Closure** (facade) **•Primary** (structural) **•Mechanical** •Secondary (partitions) (listed in order of endurance)

Highlighted areas indicate more durable qualities.

416 Marlborough Street

The first building is located at 416 Marlborough Street. A masonry building located on the corner of Massachusetts Avenue and Marlborough Street. Originally containing 32 multi-bedroom apartments, the firm of Childs, Bertman, Tseckares, and Casendino, Inc. renovated the building in 1989 to contain 78 one and two bedroom condominiums. An interesting aspect of this renovation was that the whole building was completely reorganized within the existing foot print, as only a single story mansard roof was added to the original eight stories.

Other qualities which made the Marlborough interesting to this exploration were that it was an example of a building which was part of an established residential fabric in the Back Bay. While clearly generated from a set of behaviors repeated throughout the neighborhood (building set back from street with raised entries to generate a zone of privacy between the building and the street edge, load bearing masonry construction with wood frame infill within fire zones, etc.) this building is also unique as it is one of the exceptions set up by the organizational 'rules' of the Back Bay to build the transitions. For example, the scale is much larger signifying an end of the smaller residential neighborhood and making a screen from the larger more commercial uses of the city scale intervention at Massachusetts Avenue. It is really a fairly standard apartment building which became site specific via particular responses to local conditions of scale and the relationships of public to private.



234 Berkeley Street

The second building is 234 Berkeley Street. It is a Beaux Arts masonry building built in 1864 to house the Museum of Natural History. After several renovations by the museum, the building was reinhabited by the store Bonwit Teller in 1947. It was at this time that the large central space was filled in at the third floor balcony and elevators were installed. Finally in 1989 Childs, Bertman, Tseckares, and Casendino Inc. renovated the building to accommodate the store, Louis of Boston. The third floor was reopened and the central stair from ground level restored. These multiple reinhabitations were what made this building potentially interesting to this investigation.

As far as building types go, the Berkeley Street building represents the opposite extreme to the Marlborough building as it was an 'object'/ institutional building around which the rest of the fabric grew rather than a continuation of that fabric. It was also intended to be a public building rather than a more private, residential structure. Like the Marlborough, it is located at a transition zone within the city where the more residential and smaller business areas of the Back Bay meet the large scale commercial buildings of Boylston Street. The uses for which they were renovated were also similar to the original inhabitation.

DIMENSION

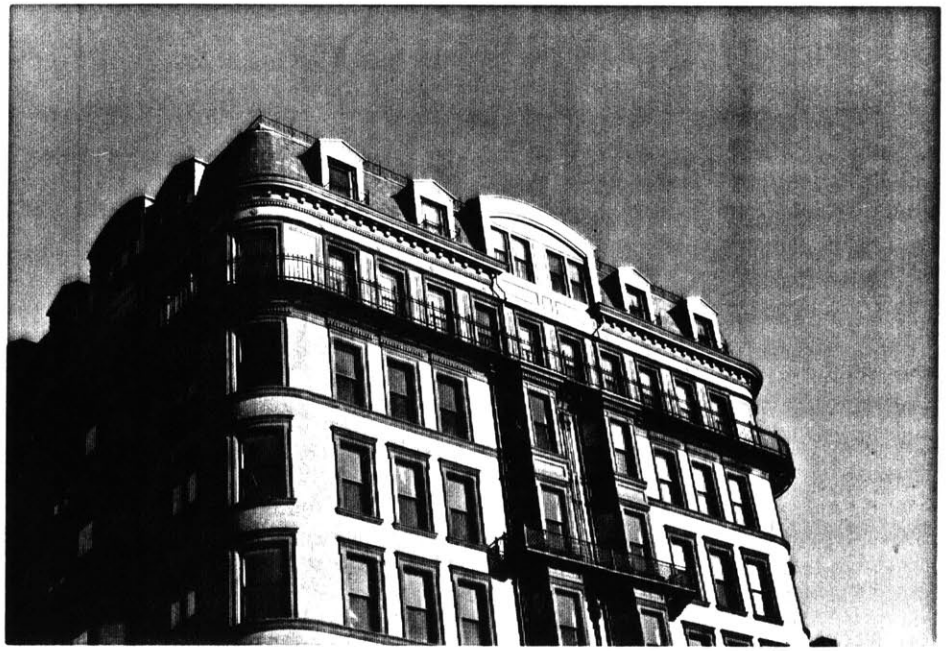
A variety of sizes exist in both the Marlborough and the Berkeley buildings where the elevations, plans and sections demonstrate a range of dimensions from site to material size, relating to the buildings contextual, structural, and use sizes. The intensity of the range tends to relate directly to the proximity of the user to the particular definition. For example, the street level definition of an elevation tends to contain smaller dimensions than the higher stories which are seen from a distance, while the entrances where a user approaches the building closely, are more intensely defined.

Street level zone, Marlborough St. building

When choosing the dimensions to be used in the construction of a building, if only the minimal sizes are used, the use of the building/space will be restricted to a more singular interpretation and will be less open to reinterpretation. More possibilities are provided for if a certain amount of generosity is allowed in the choice of dimensions for a space. This capacity can be tested by trying potential inhabitations of the building/space, again at all scales (ie. units in the building, rooms in the units, furniture in the rooms, etc.).

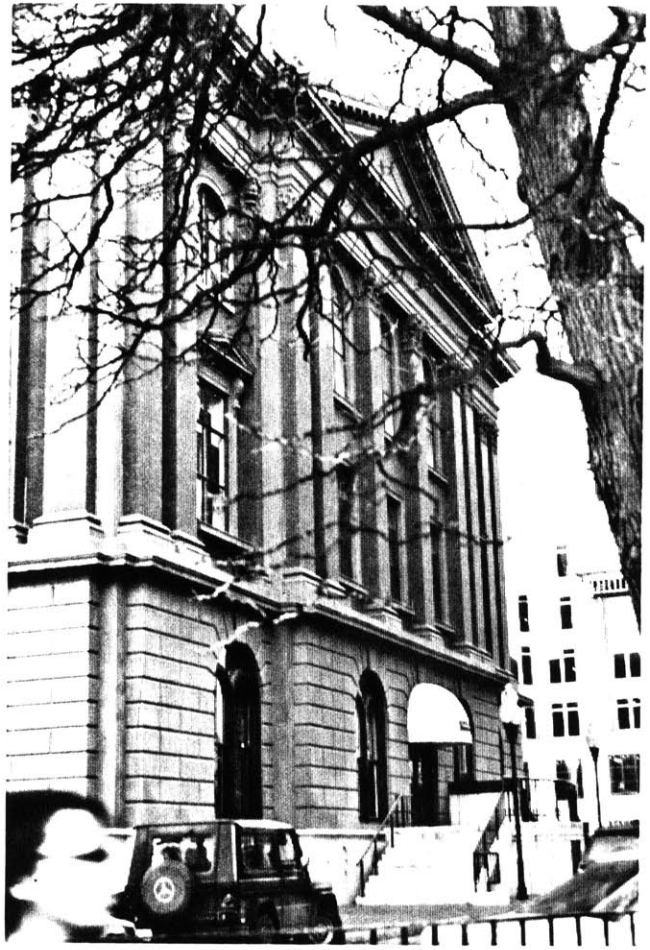
Within this category one is providing a range of sizes which allow a continuity in the understanding of how one scale relates to the next. Moves at building size provide an understanding of how the building relates to the surrounding environment. Within that dimension the range of

Massachusetts Ave. Entrance, Marlborough St. building



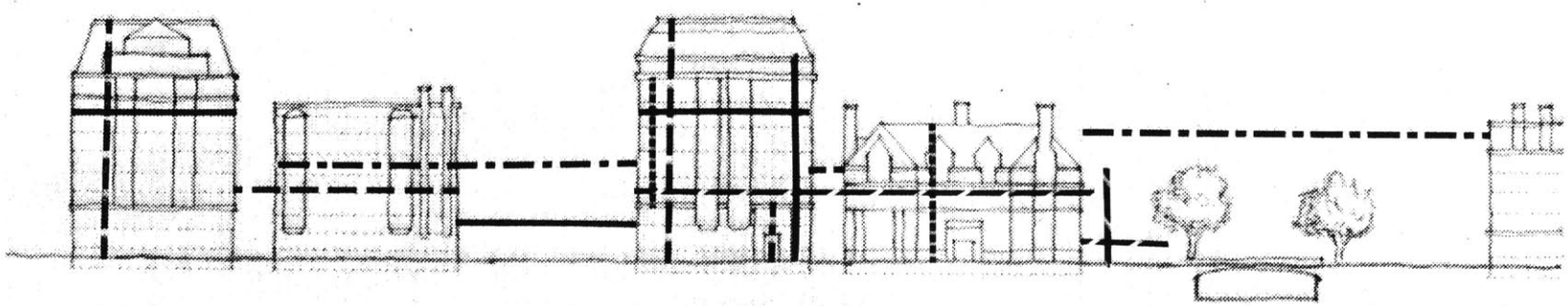
Mansard roof addition, Marlborough St. building

sizes down to and including human and material dimensions would be found as well. In this way, the relationship of the individual to the larger context is established via the intermediate sizes. Through this connection, a sense of belonging in and associating with the built environment might be established, encouraging its inhabitation. As this category relates to all sizes, it is an overlay which will give the other more general principles the site and use specific qualities which will render them more particular to the building. For this reason the analyses were carried at a variety of sizes starting at the larger district size and continuing on down through the neighborhood, building, unit, and detail sizes.

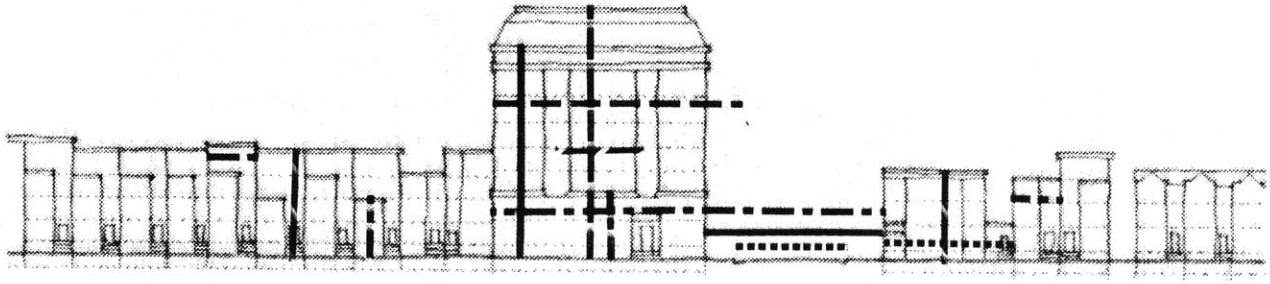


Main entrance, Berkeley St. building

Intensification of Dimensions at roof line, Berkeley St. building



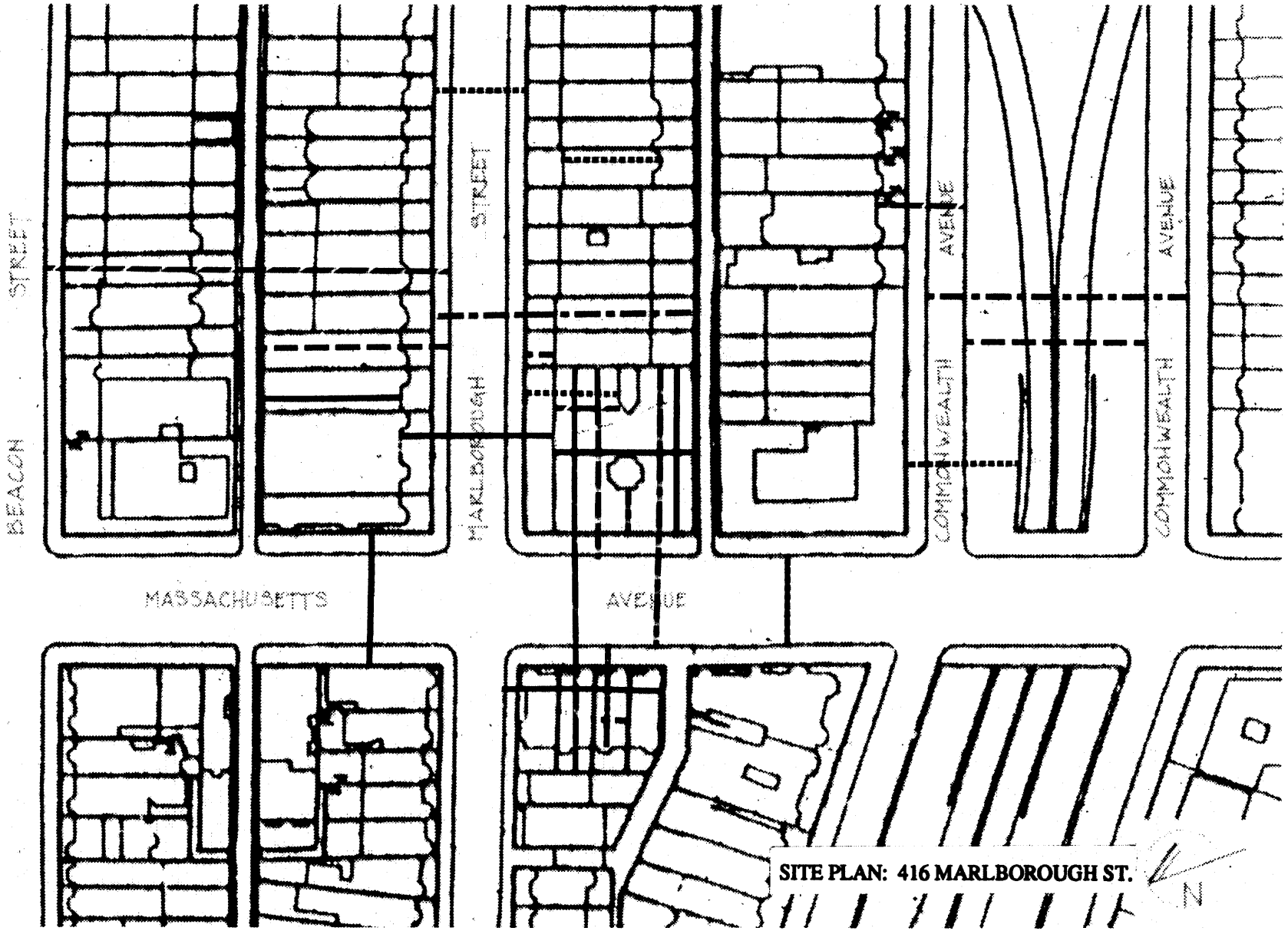
ELEVATION ALONG MASSACHUSETTS AVE.



ELEVATION ALONG MARLBOROUGH ST.

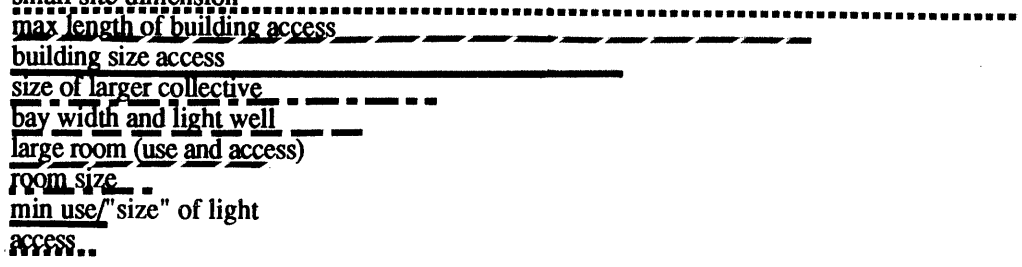
DIMENSIONAL DIAGRAM: MARLBOROUGH ST.
Scale: 1" = 100'-0"

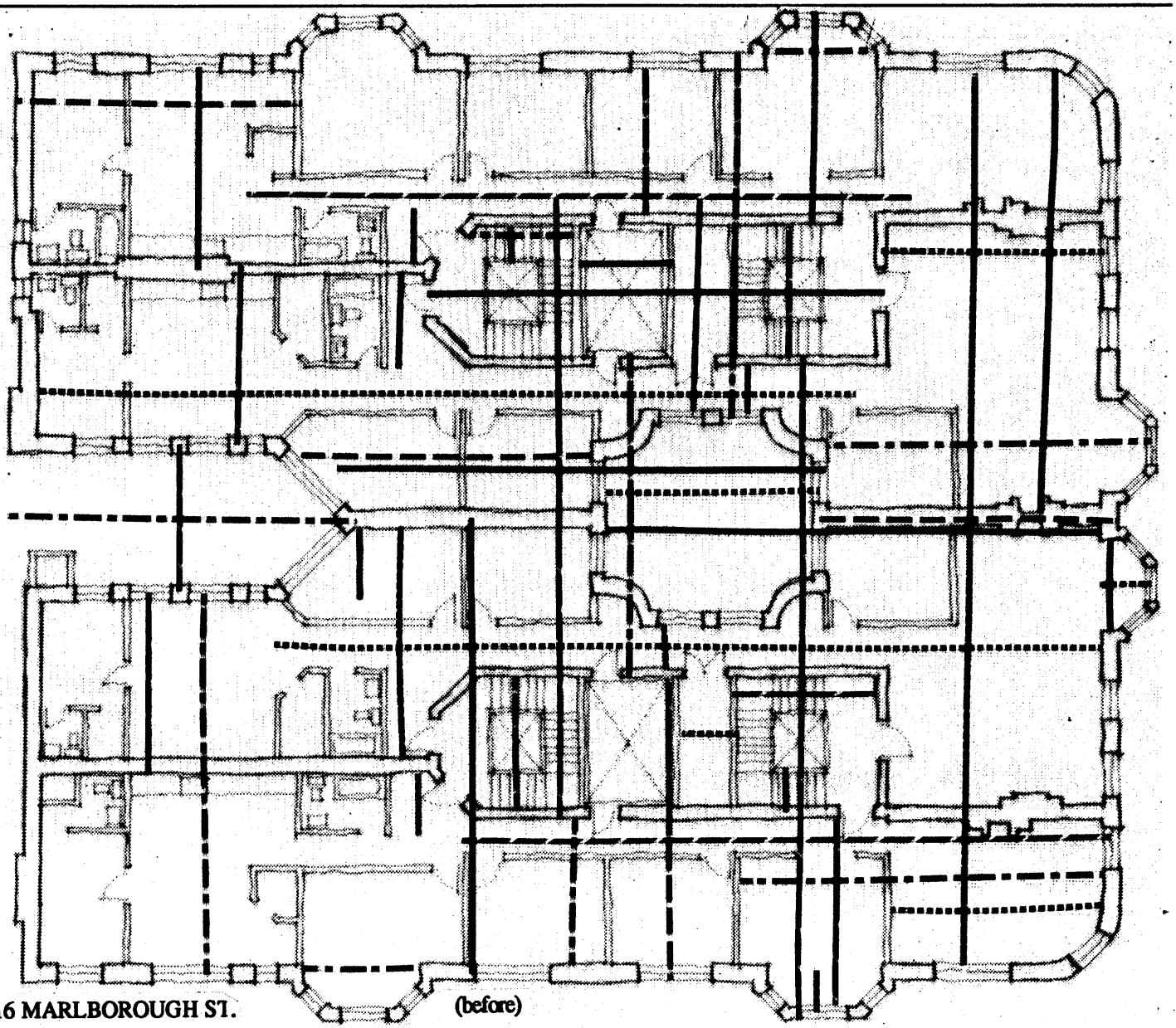
Block
Site and Street
Site
Building
Street
Bay
Pedestrian



SITE PLAN: 416 MARLBOROUGH ST.

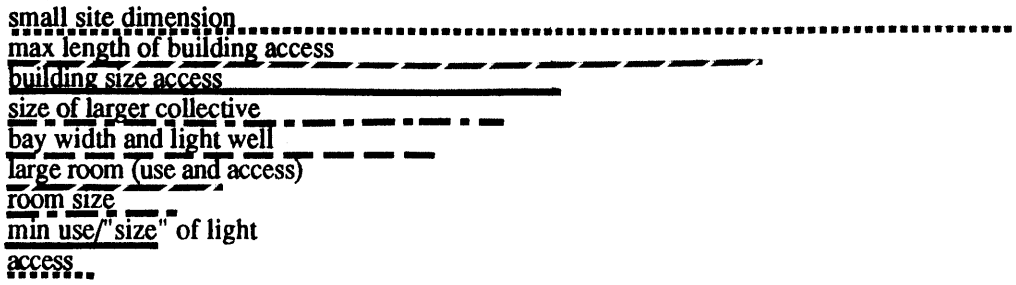
DIMENSIONAL DIAGRAM: MARLBOROUGH ST.
Scale: 1/16 = 1'-0"

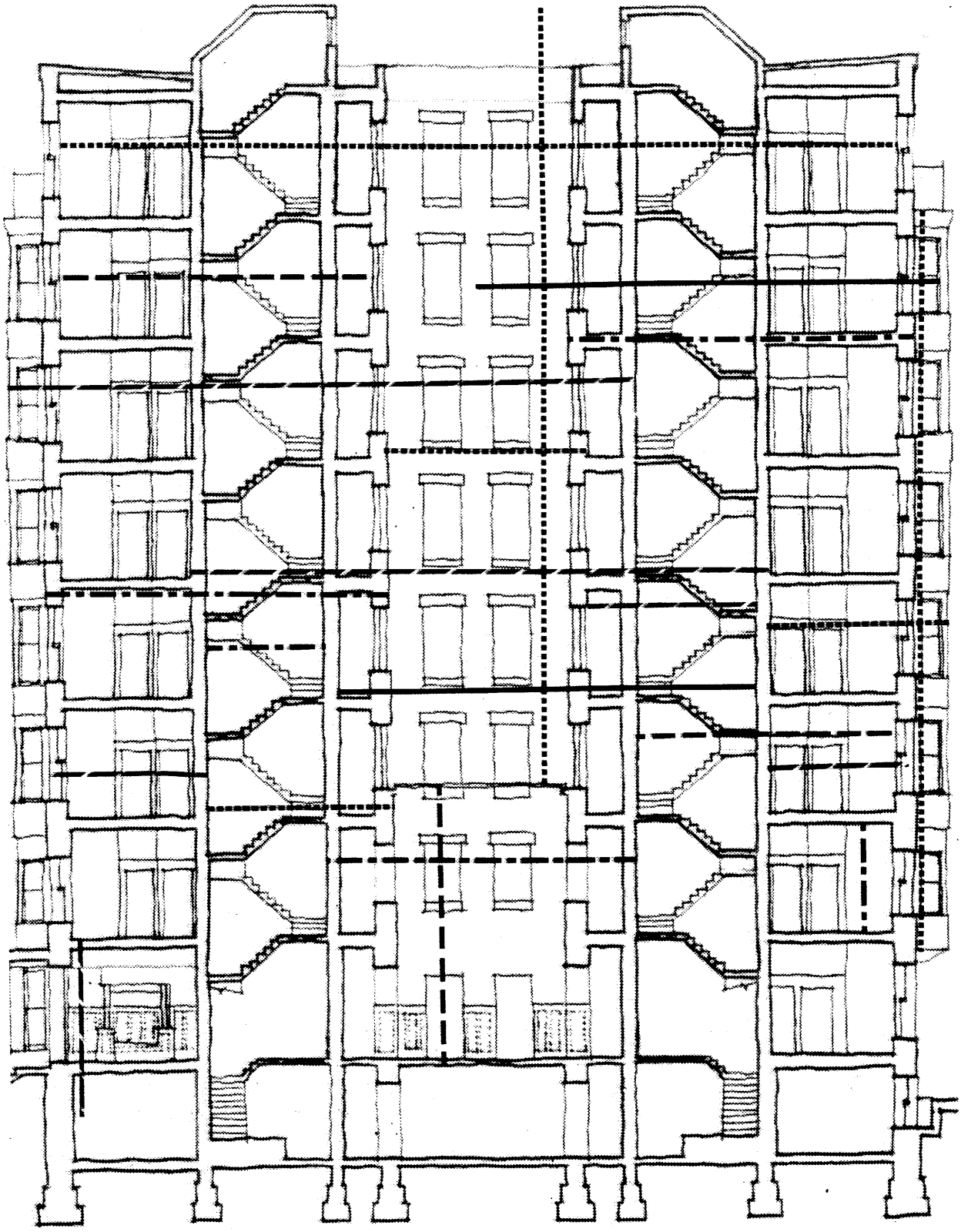




FLOOR PLAN: 416 MARLBOROUGH ST. (before)

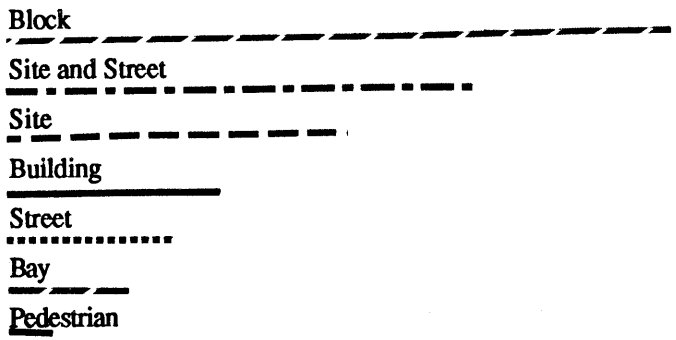
DIMENSIONAL DIAGRAM: MARLBOROUGH ST.
Scale: 1/16 = 1'-0"

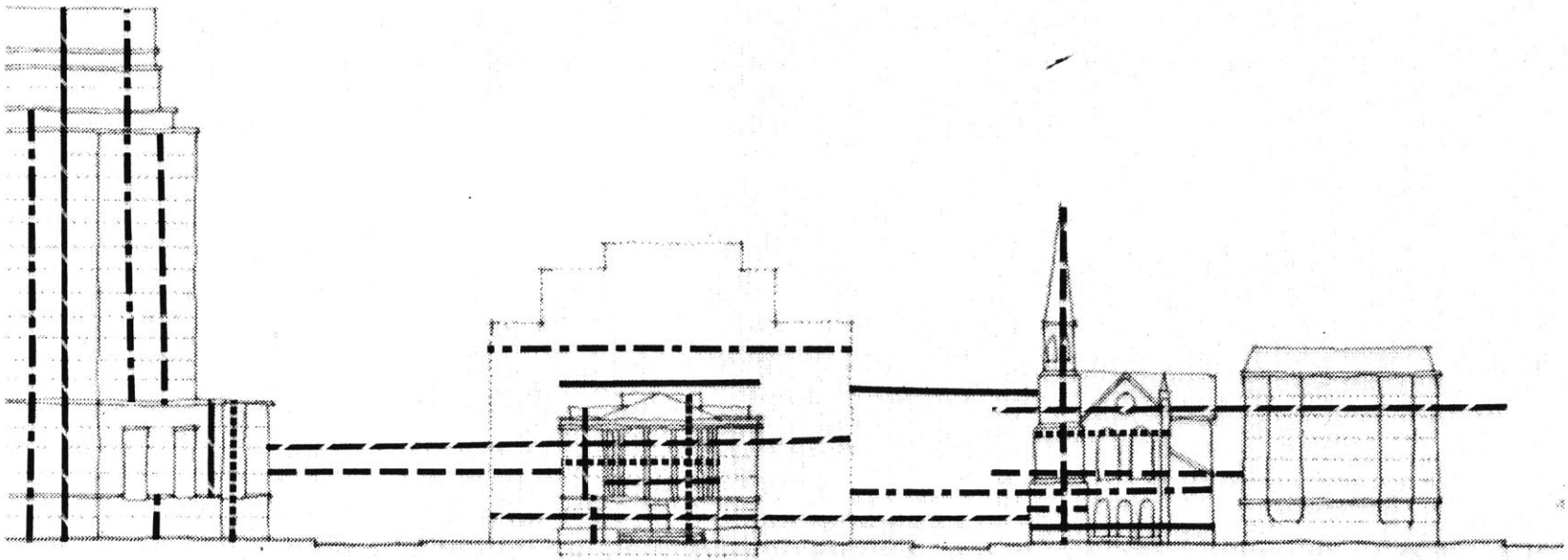




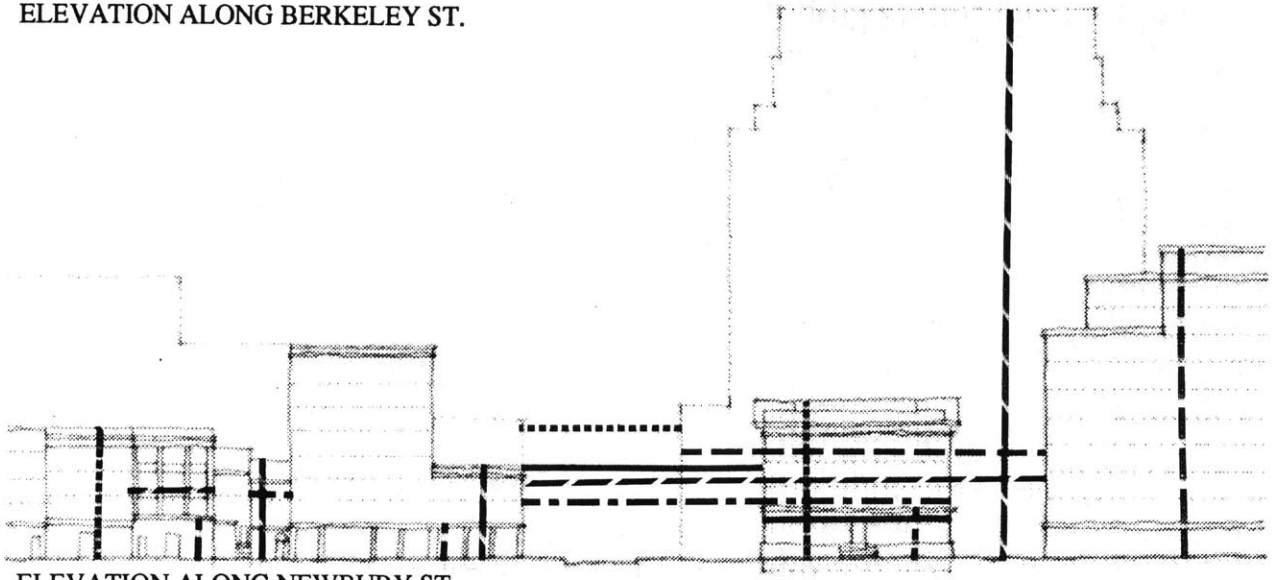
BUILDING SECTION: 416 MARLBOROUGH ST.
(before)

DIMENSIONAL DIAGRAM: BERKELEY ST.
Scale: 1" = 100'-0"





ELEVATION ALONG BERKELEY ST.



ELEVATION ALONG NEWBURY ST.

DIMENSIONAL DIAGRAM: BERKELEY ST.
Scale: 1" = 100'-0"

Block

Site and Street

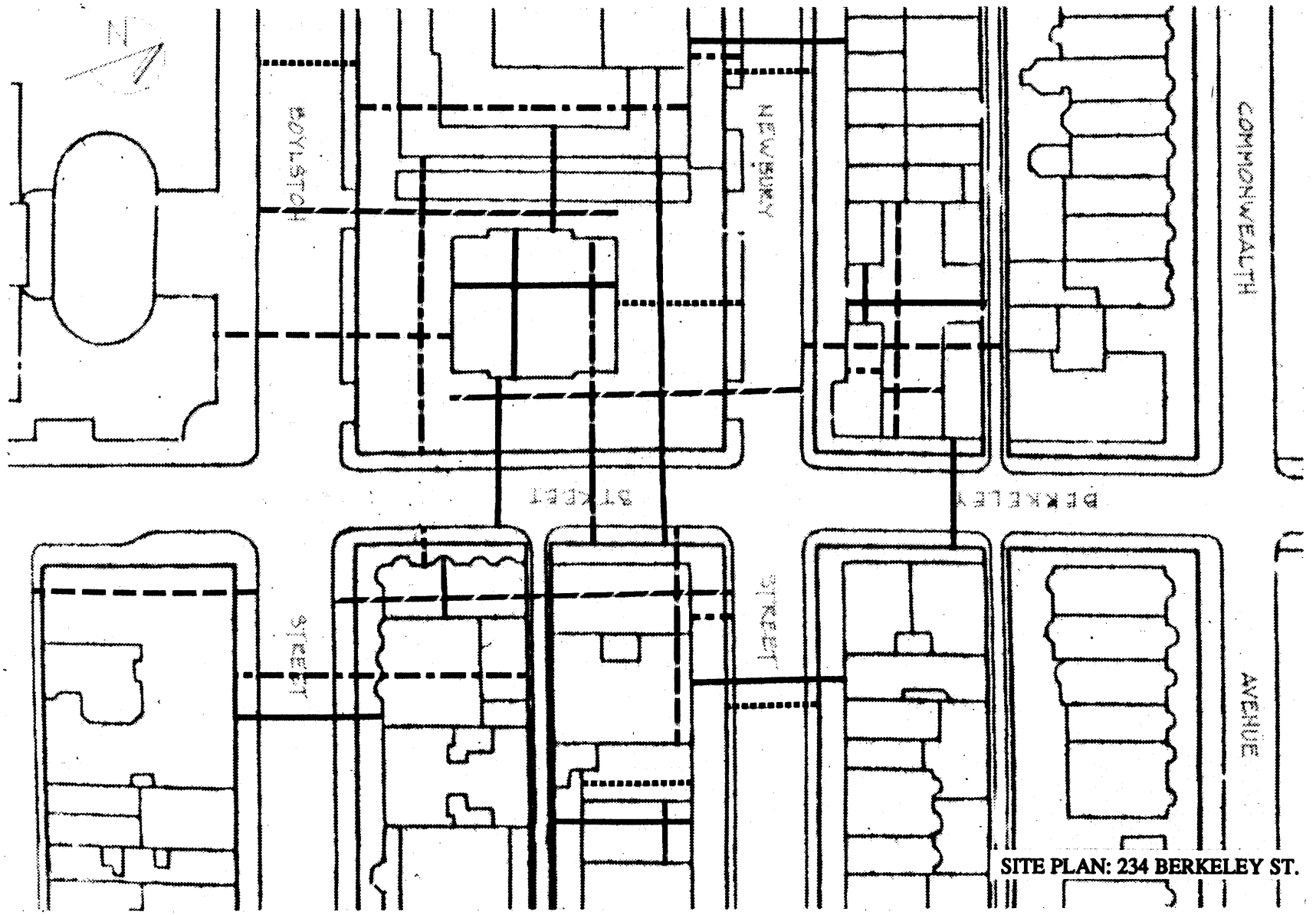
Site

Building

Street

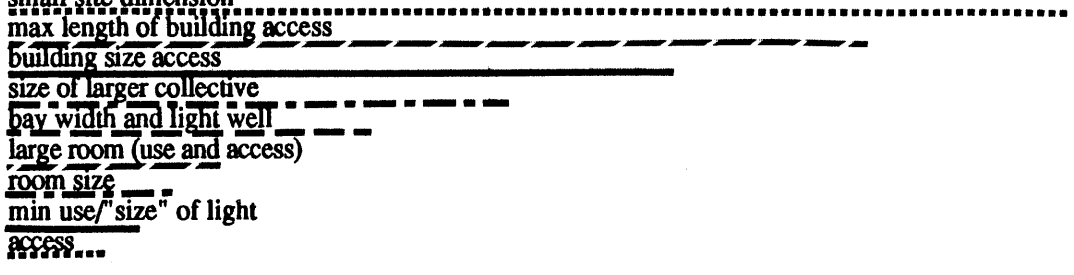
Bay

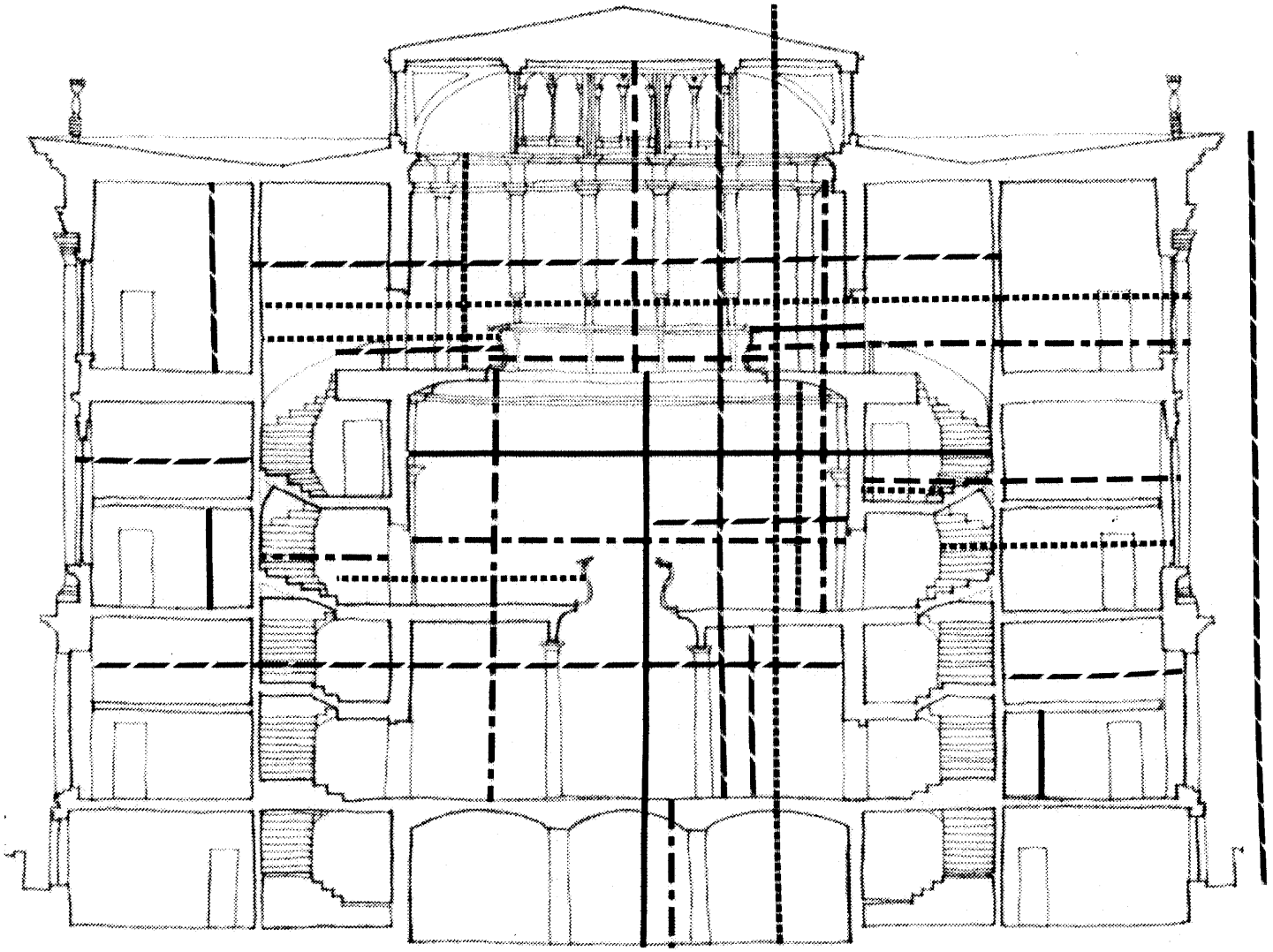
Pedestrian



SITE PLAN: 234 BERKELEY ST.

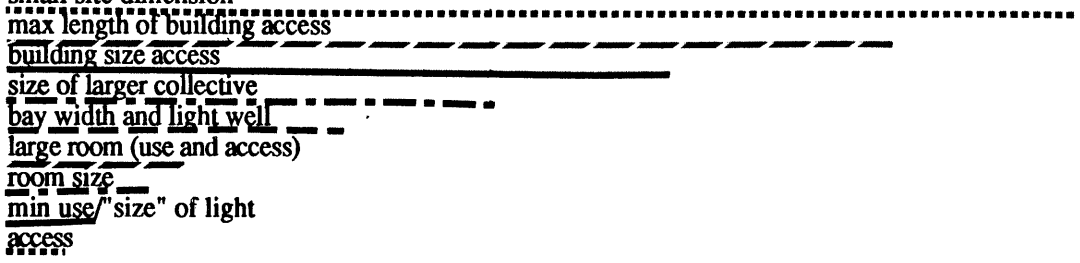
DIMENSIONAL DIAGRAM: BERKELEY ST.
Scale: 1/16" = 1'-0"

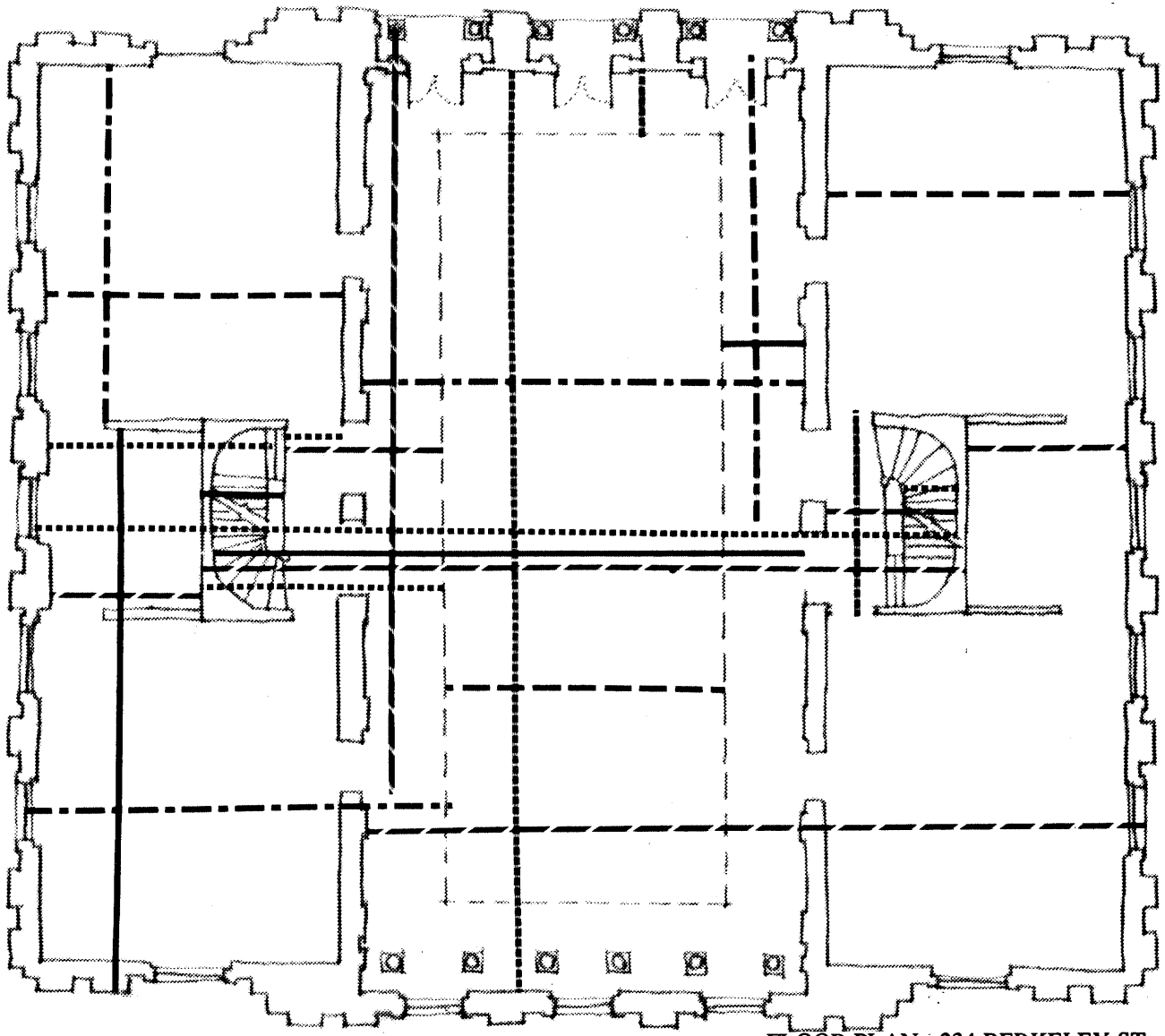




BUILDING SECTION: 234 BERKELEY ST.

DIMENSIONAL DIAGRAM: BERKELEY ST.
Scale: 1/16" = 1'-0"





FLOOR PLAN: 234 BERKELEY ST.

Looking north on Massachusetts Ave. toward the Harvard Bridge

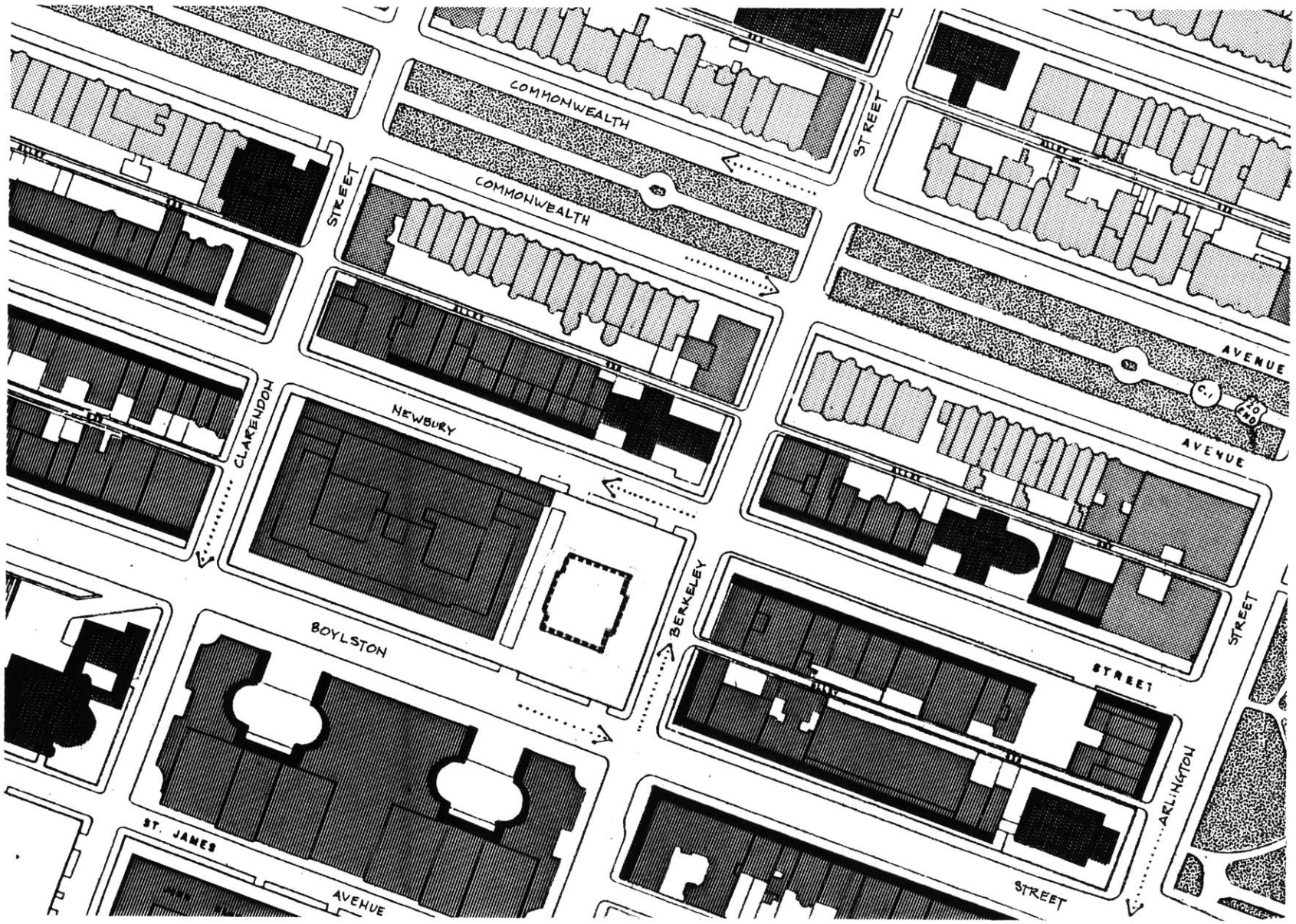
LOCATION

After analyzing both example buildings, it is clear that each have fulfilled the role of a transition building within their districts. The Marlborough building makes the transition from residential to commercial and from a smaller to a larger scale by building the next size up with the smaller scale use. The Berkeley building allows for drastic changes in scale and density of use by maintaining a space or break in the district's fabric which allows this range of sizes and program to be seen and understood.

Retail/ residential buildings across Massachusetts Ave.

As the concern of this thesis is to build a *continuity* with the existing built environment certainly it is appropriate to understand as best one can what conditions exist before making an intervention on the site. This continuity includes 'unbuilt' environments as well as 'built'. Light, topology, neighboring buildings, etc. are all qualities unique to the site which can be exploited to enrich the possibilities while connecting the building to the larger configuration. This connection to the larger context is an important key in the durability of a building. If a building is contributing to a greater order than that contained within its boundaries, it is more likely to be cared for and cared about by elements beyond its immediate territory as well as its inhabitants.

Looking south down Massachusetts Ave.


COMMONWEALTH
STREET
COMMONWEALTH
STREET
AVENUE
AVENUE
CLARENDON
NEWBURY
BERKELEY
BOYLSTON
STREET
STREET
ARLINGTON
ST. JAMES
AVENUE
STREET

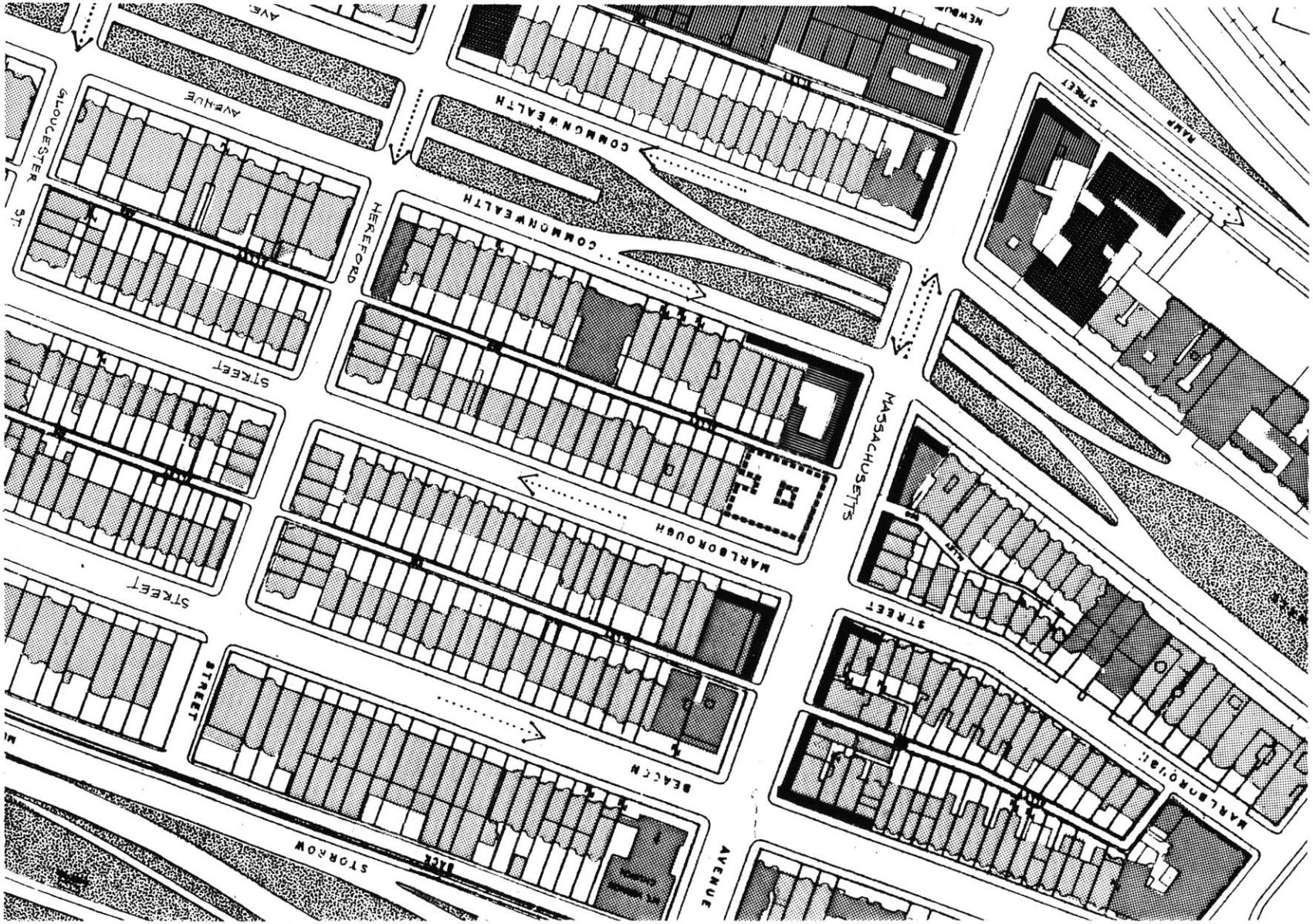
Panorama including south edge of Newbury and down Berkeley.

LOCATION DIAGRAM: BERKELEY ST.

Scale: 1" = 200'-0"

- Residential
- Housing
- Commercial
- Institutional Buildings
- Park
- Direction of Traffic

Panorama of Berkeley St. building


AVE
AVE-HUE
GLOUCESTER ST
COMMONWEALTH
COMMONWEALTH
HEREFORD
STREET
STREET
STREET
MASSACHUSETTS
MASS
STREET
HARLBOROUGH
HARLBOROUGH
BEACON
STORROW
AVENUE

View east on Marlborough St.

This category relates to the the conditions within and around the site including the physical, cultural, social, and temporal characteristics in the existing built, or unbuilt environment. In searching for a term for this quality, words like landscape, context, environment and syntax were proposed, but each held connotations which would have to be explained away. In the end *location* seems to be the word that is equal to the task.This category is not studied with the goal of building more of the same, but with the hopes of revealing what is appropriate.

LOCATION DIAGRAM: MARLBOROUGH ST.

Scale: 1" = 200'-0"

- Residential
- Housing
- Commercial
- Institutional Buildings
- Park
- ·····> - Direction of Traffic

ACCESS

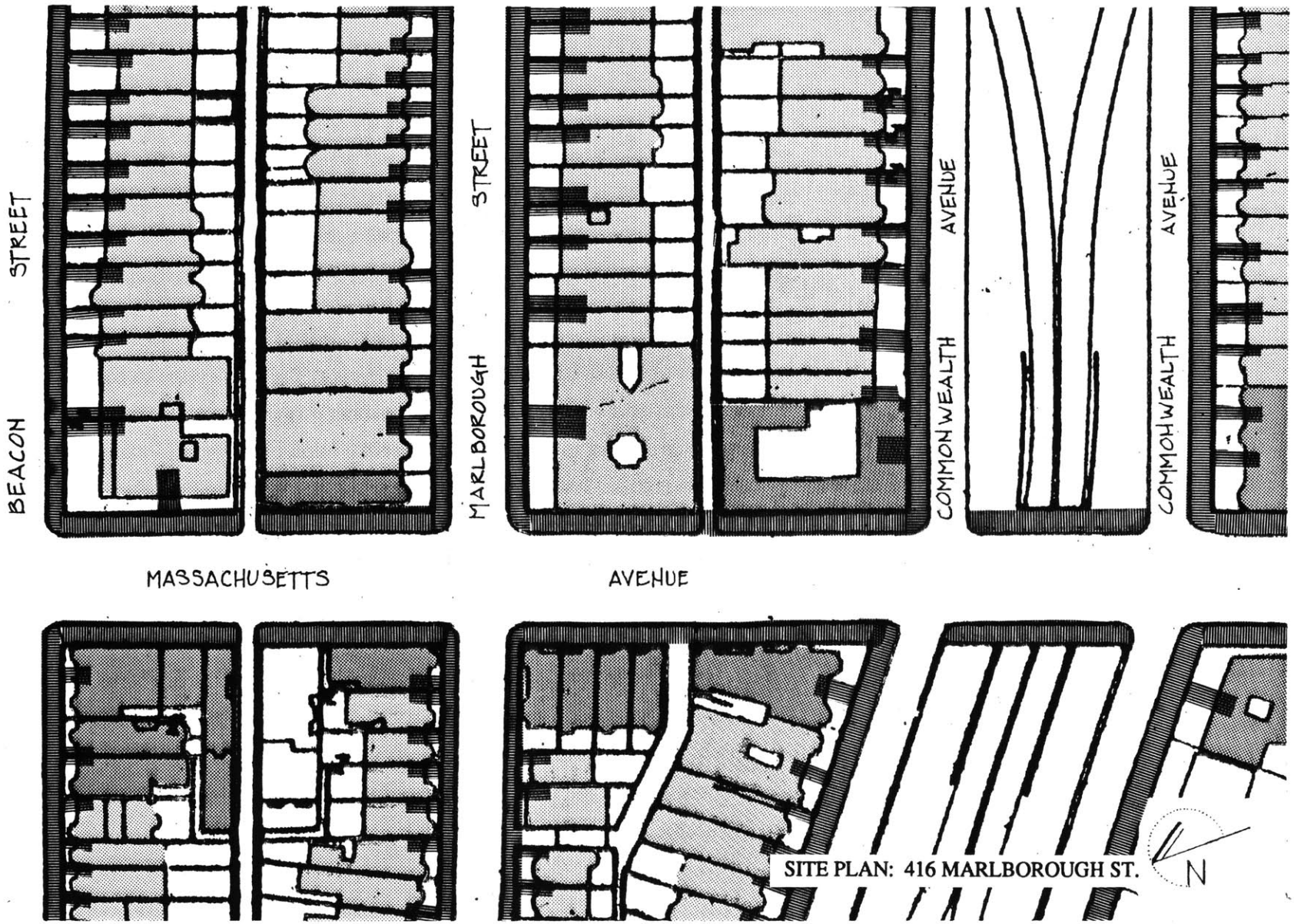
The organization of the access may change completely within the building and certainly within the smaller units as demonstrated by the reinhabitation of the Marlborough building. Here, what had seemed to be a clear directional and hierarchical organization, became a centrally organized plan with practically uniform relationships to the larger access system within the building and also within the unit.

The general accessibility of a building or space to the surrounding neighborhood will determine to a large extent the types of inhabitation possible. Not all spaces need to have equal accessibility nor should they. If a variety of public to private relationships are provided with in a building a variety of needs can be accommodated without major renovation. If the spaces at ground level are generally open and easily accessible, chances are, more public uses such as retail, or service oriented businesses will occupy them while more enclosed and or less accessible spaces may become offices residential.

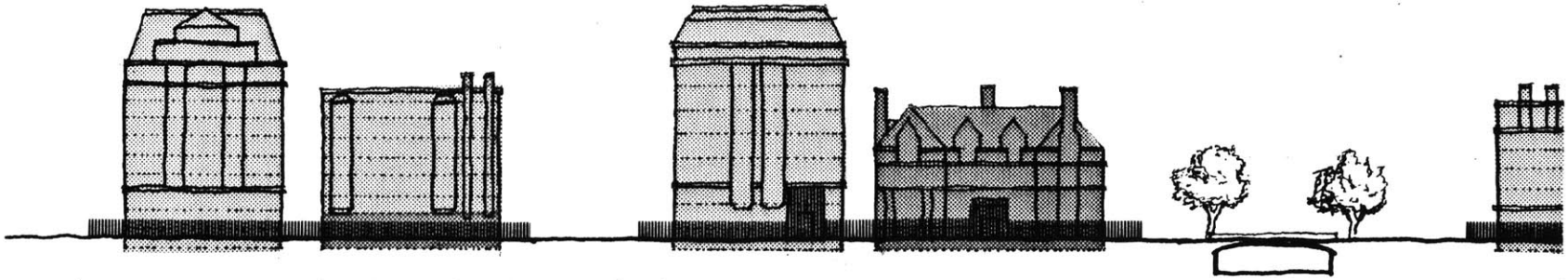
These diagrams explore the hierarchy of territory and accessibility through the relation of public versus private, the sense of orientation within a building, and the understanding of how to move through a given environment. A word frequently used for this quality is *access*. This word is used to describe not only the system by which one is able to move

through a building, but also how that system establishes relationships between areas which are more accessible, or public, and areas which have a more restricted access, or private. It is also under this category that territory is defined and designated so that each inhabitant knows the extent of the area which is controlled by them and what territory is within the domain of the collective. This is important as it is necessary to make clear who has what control over which space, as a lack of clarity in this area tends to generate spaces which will go unused and therefore unmaintained.

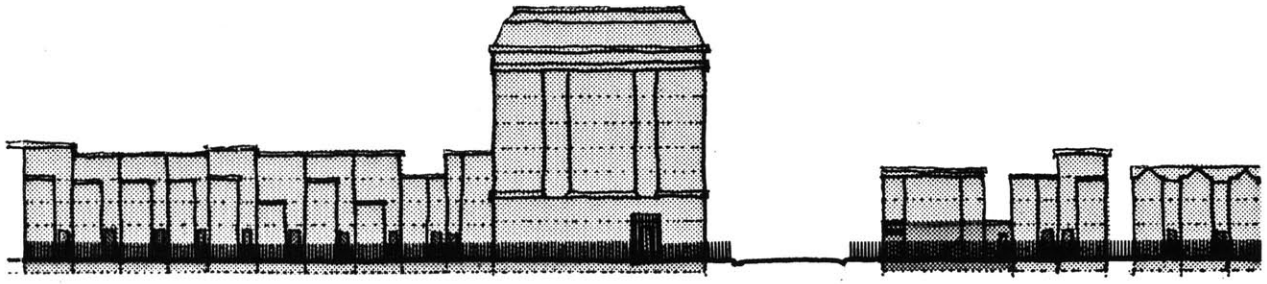
Broad initial moves establish a strong reference for the smaller more use/inhabitant specific interventions. In this way the connection to the larger context of the existing built environment remains clear and the space remains a participant in the larger order while allowing a specific activity to go on at the smaller level. Within the building there should be orders at each size. At the city size the building is a privacy to the public access of the streets. An atrium, at the building size, may be the public space from which corridors lead to more private wings or units. At the next level the corridors become the public territory which organizes the individual office suites. And so one can continue on down in scale to the size of rooms and furniture configurations within those rooms. In the analysis, however, both buildings show that the established access systems tend to display permanence only at the size where the building ties back into the neighborhood.



SITE PLAN: 416 MARLBOROUGH ST.



ELEVATION ALONG MASSACHUSETTS AVE.



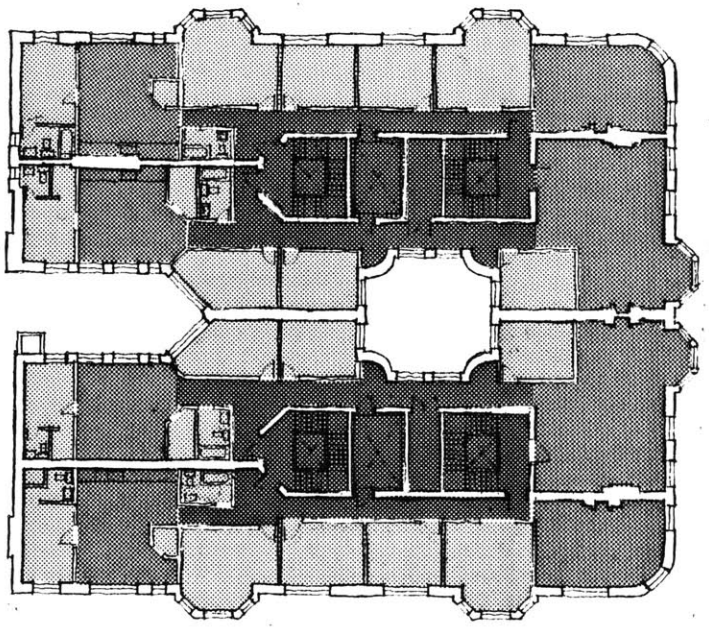
ELEVATION ALONG MARLBOROUGH ST.

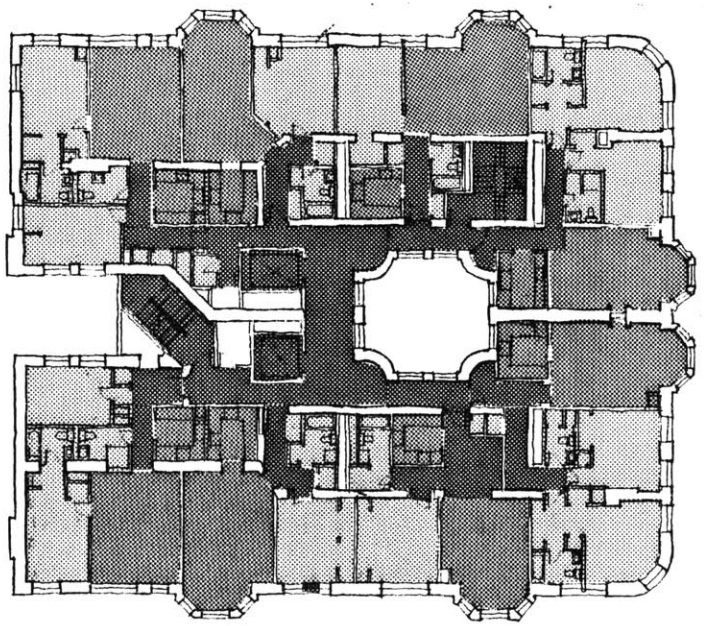
ACCESS DIAGRAM: MARLBOROUGH ST.
Scale: 1" = 100'- 0"

- public

- semi public

- privacy





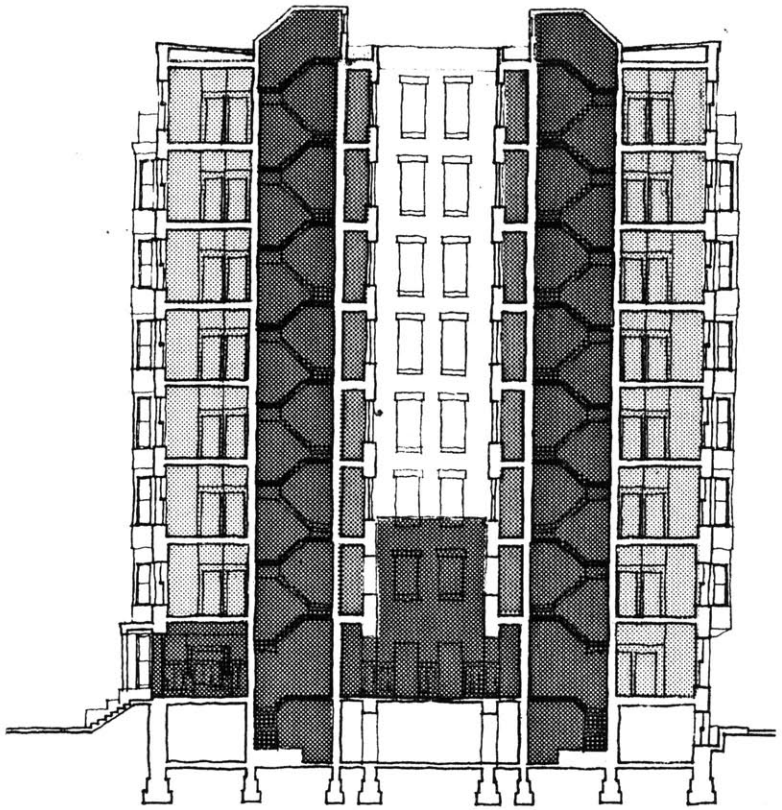
FLOOR PLAN: 416 MARLBOROUGH ST. (before) (after)

ACCESS DIAGRAM: MARLBOROUGH ST.
Scale: 1/32" = 1'- 0"

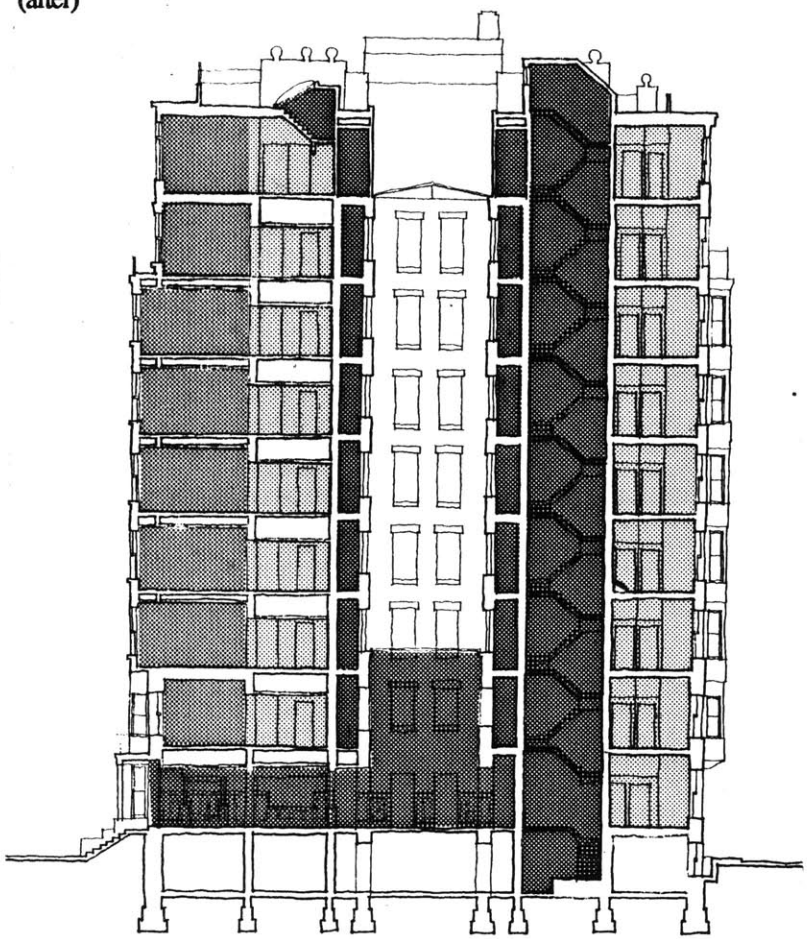
- public
- semi public
- privacy

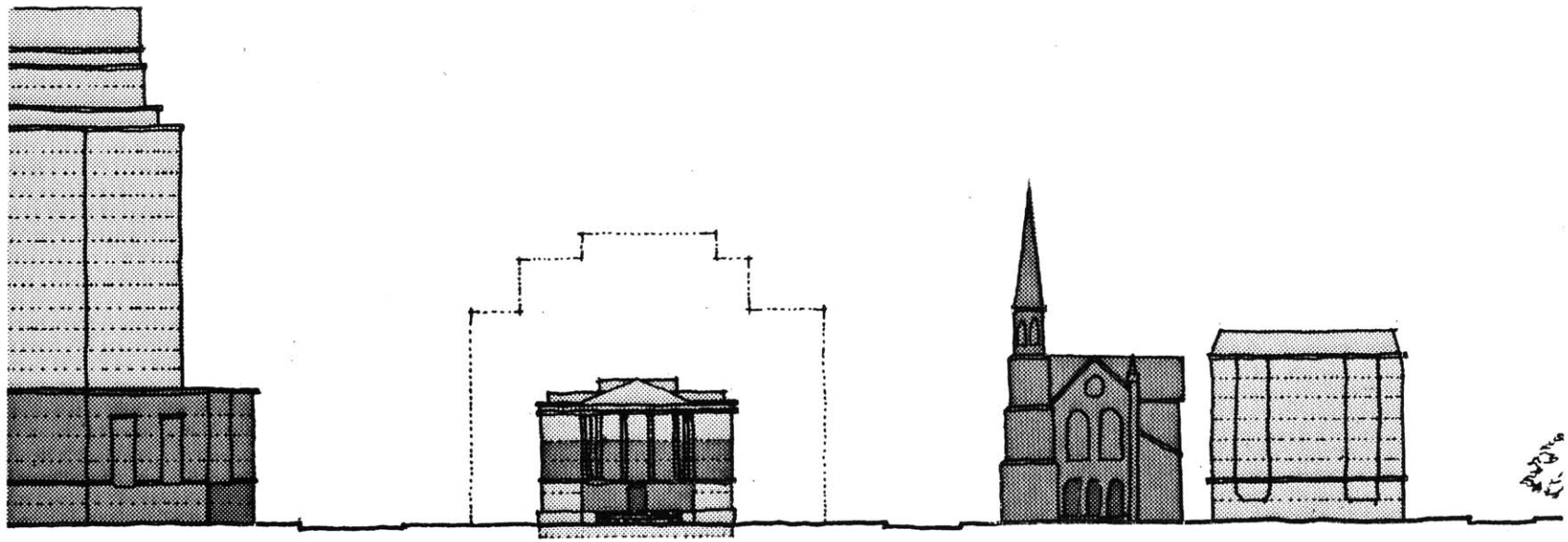
BUILDING SECTION: 416 MARLBOROUGH ST.

(before)



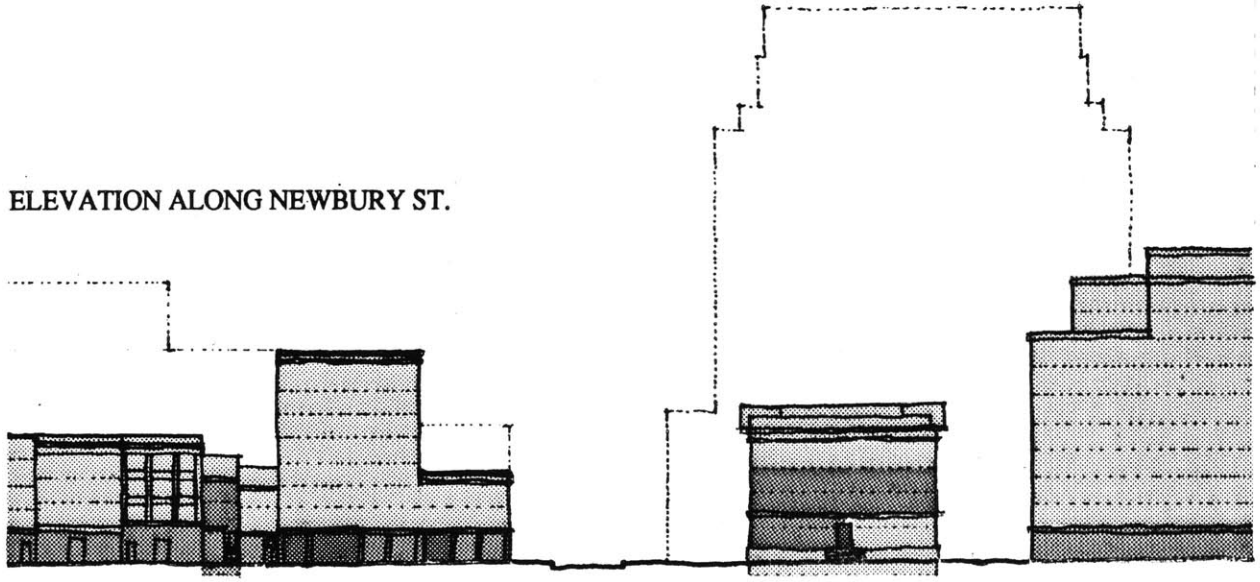
(after)





ELEVATION ALONG BERKELEY ST.

ELEVATION ALONG NEWBURY ST.

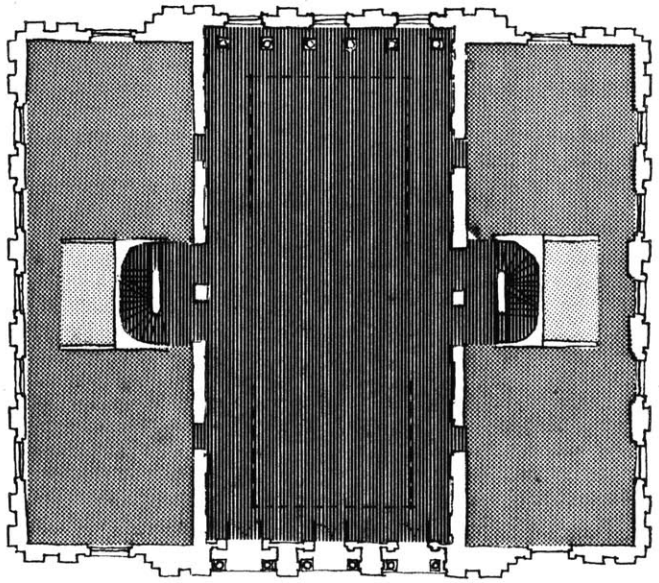


ACCESS DIAGRAM: BERKELEY ST.

- public
- semi public
- privacy

SITE PLAN: 234 BERKELEY ST.

FLOOR PLAN: 234 BERKELEY ST. (Louis of Boston)



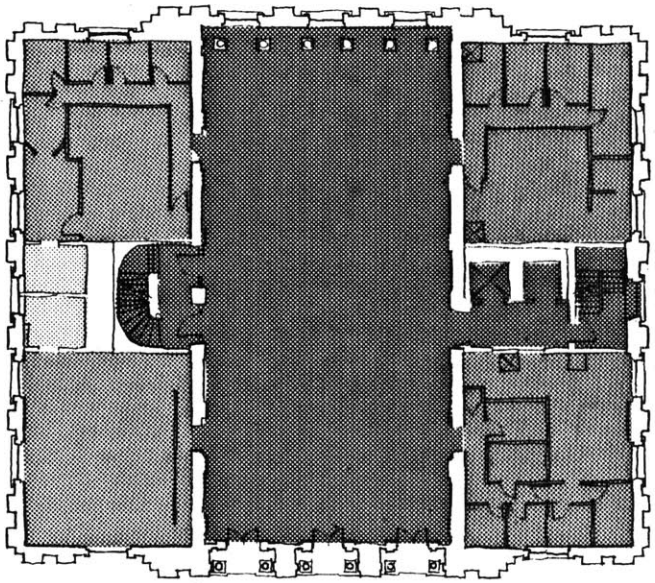
(Museum)

ACCESS DIAGRAM: BERKELEY ST.

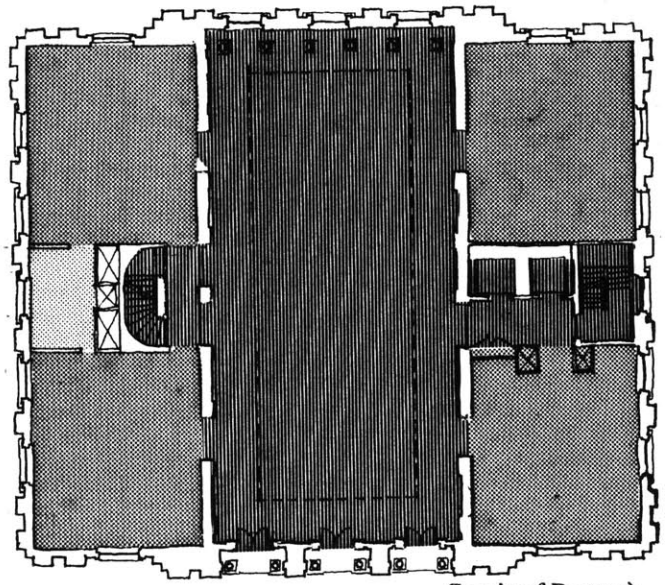
- public

- semi public

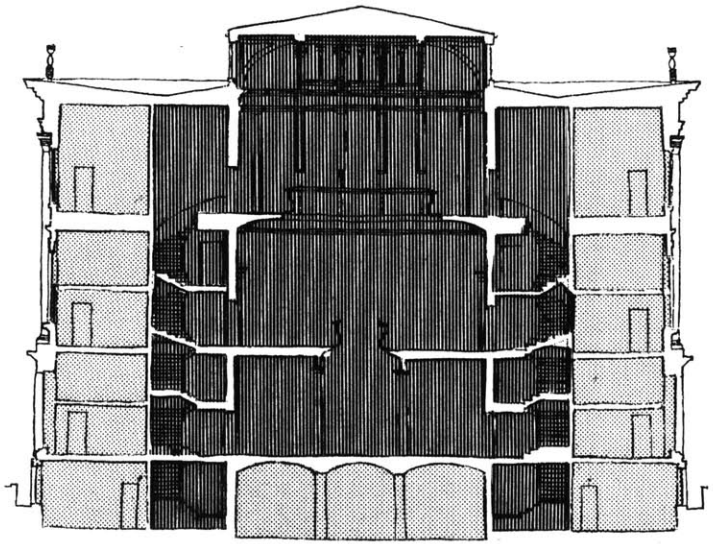
- privacy



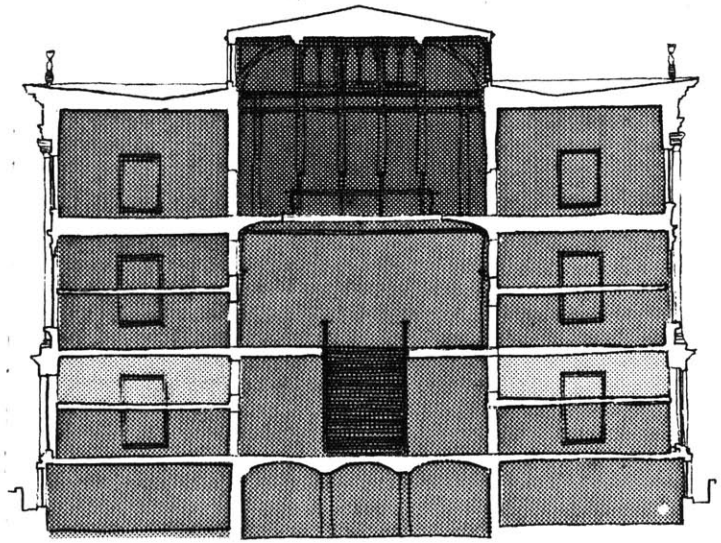
(Bonwitt Teller)



(Louis of Boston)

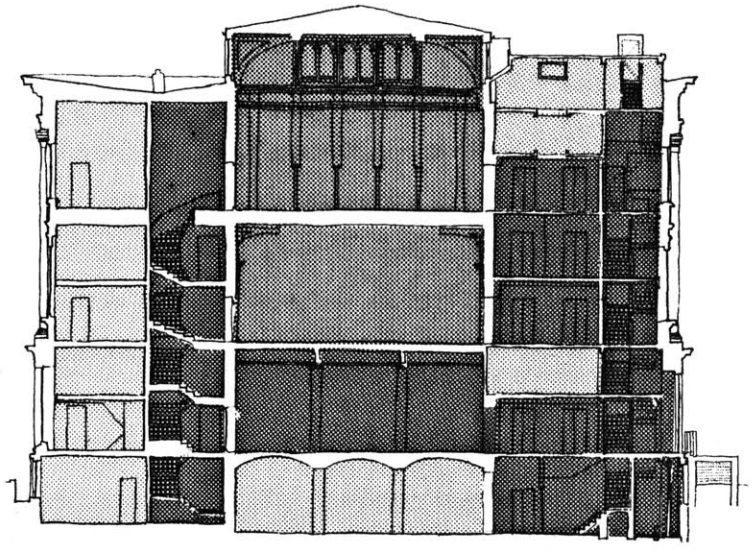


(Museum)

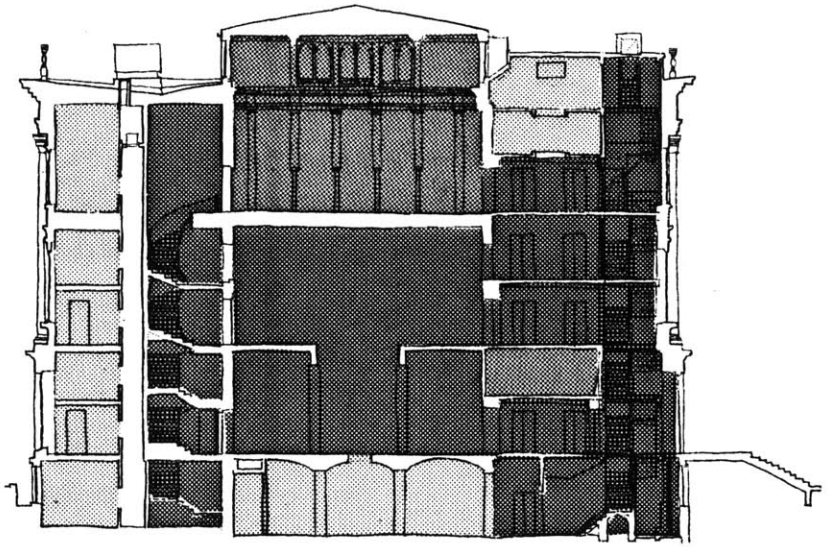


ACCESS DIAGRAM: BERKELEY ST.

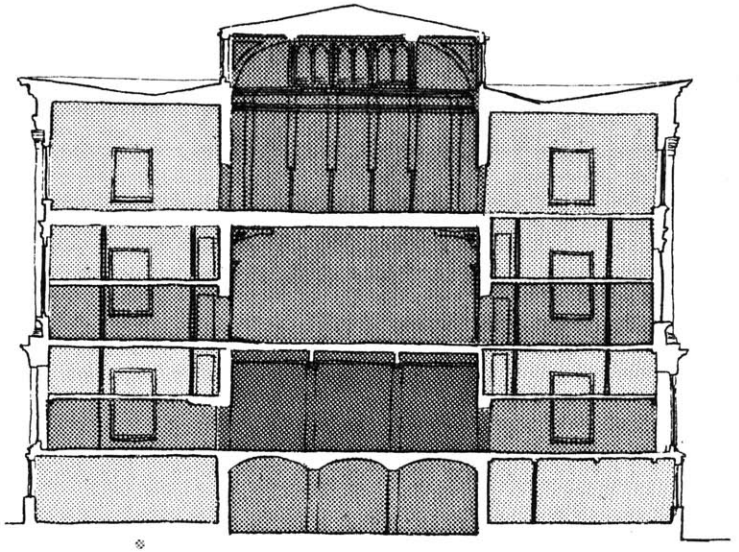
- public
- semi public
- privacy

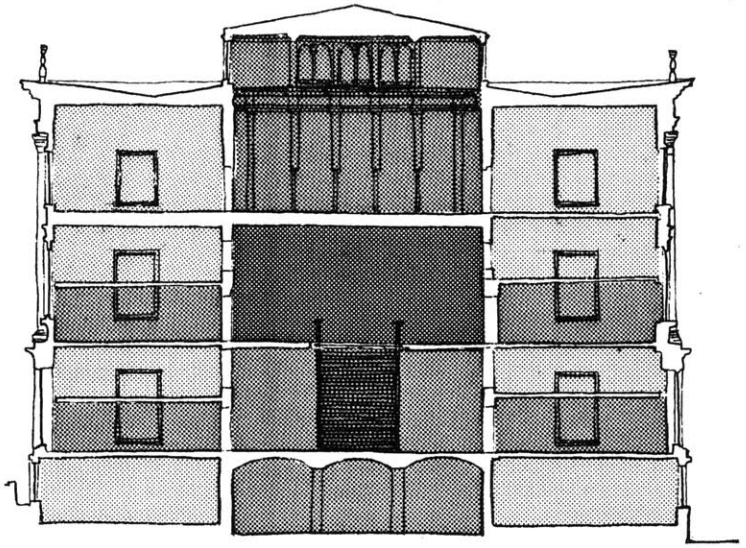


(Bonwitt Teller)



(Louis of Boston)





SPATIAL ORGANIZATION

A large central vertical space is the organizer in both buildings analyzed; a light well in the Marlborough building and a multistory interior space in the Berkeley St. building. These spaces remained constant as organizers in the building even when they were partially filled in. Less spectacular vertical spaces such as stairwells, elevators, and mechanical chases also tended to remain as vertical connections even if their uses were changed, for example the old stairwells in the Marlborough building being used for the new mechanical systems. At the neighborhood size each building completes an existing spatial organization. The Marlborough building completing the definition of a street edge and an existing fabric organized by the long blocks of the Back Bay, while the Berkeley building remained an object with an associated territory around which the surrounding buildings grew. In each building the spatial organization at unit size was often completely changed.

From these observations it is clear that a building which cooperates with an existing spatial order in its surrounding territory will become a more indispensable part of that order. At the building size the vertical spatial relationships seem to be more permanent organizational elements than the actual physical structure. The location of courtyards, multi-story spaces, plumbing stacks, elevators, and fire stairs will tend to be decisions which will remain in some form or another as a building is reinhabited over time

and therefore their deployment is an effective way of building relationships with the structure which are intended to outlive the various uses.

While the physical pieces of the building are certainly contributors to an understanding of how a building might be inhabited, the *spaces* they form also provide a base for interpretation. A building organized around the strong spatial element of a courtyard is one example. In such buildings the orientation is always based on the relation to this central space. Other spatial organizers might be the opening for a grand stair case or, at unit size, the location of the kitchen and bath. Again, this sort of definition can and should happen at all scales. Any break in the three dimensional pattern of a building/space provides a point of orientation.

Marlborough St. building as "end" of Back Bay fabric

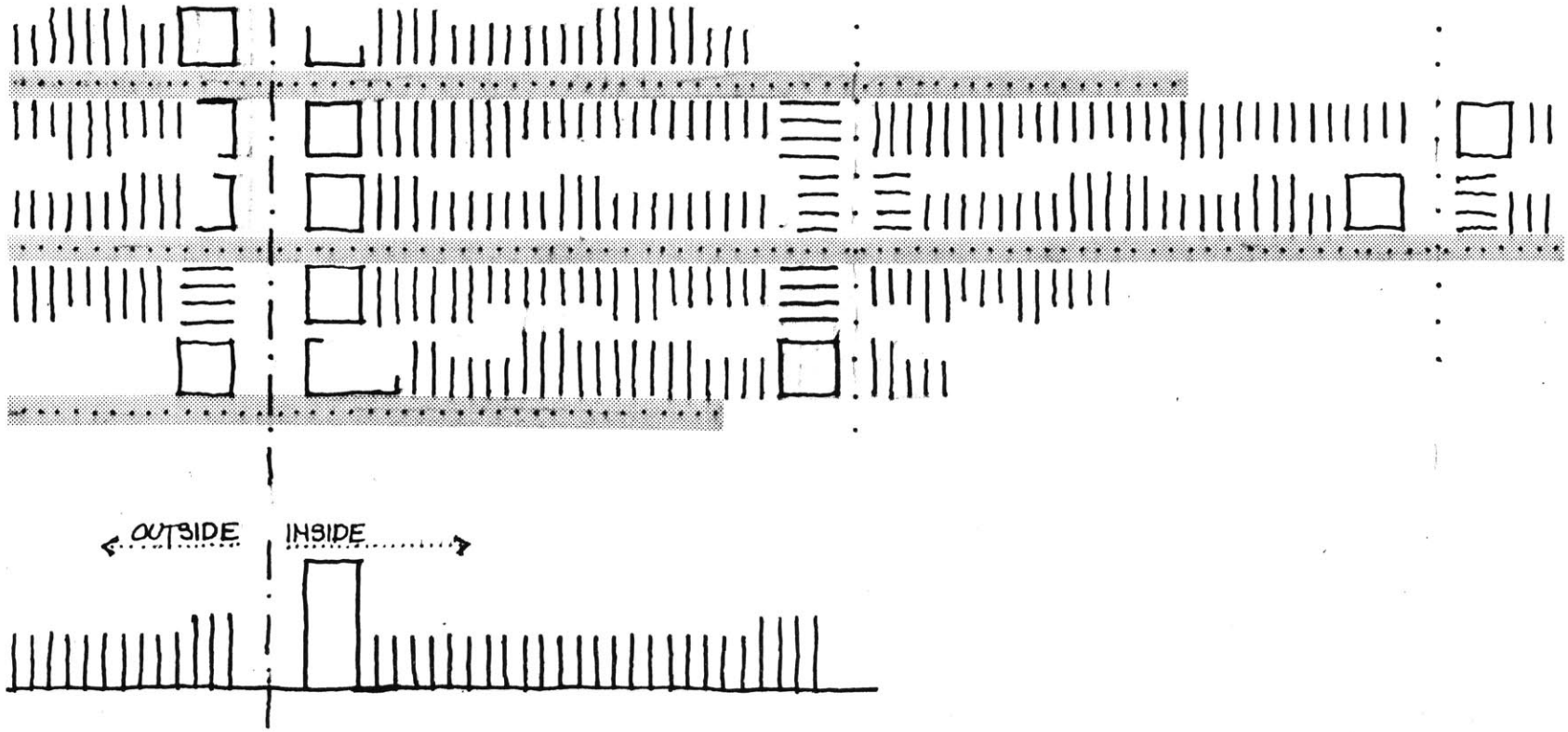
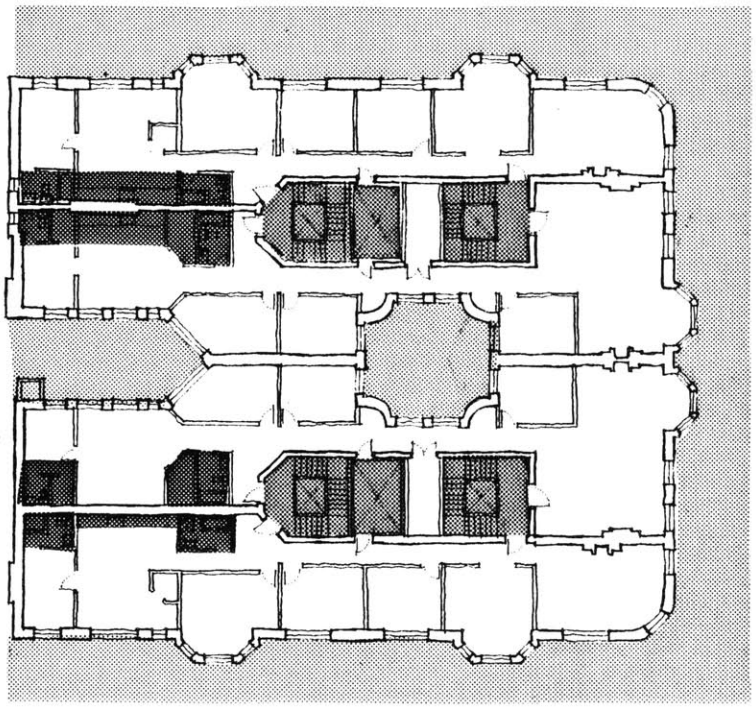
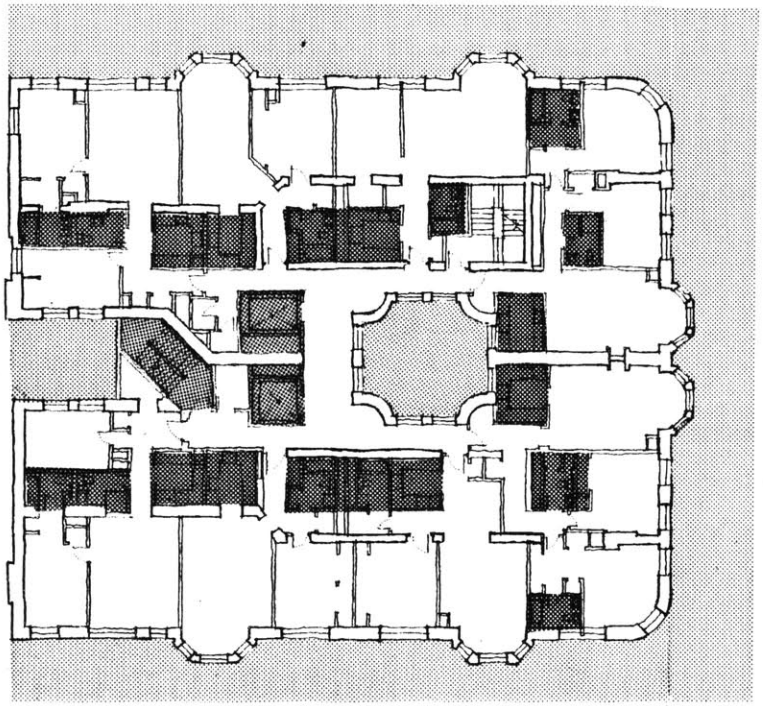


DIAGRAM OF STREET AS SPATIAL
ORGANIZER IN THE BACK BAY



(before)



(after)

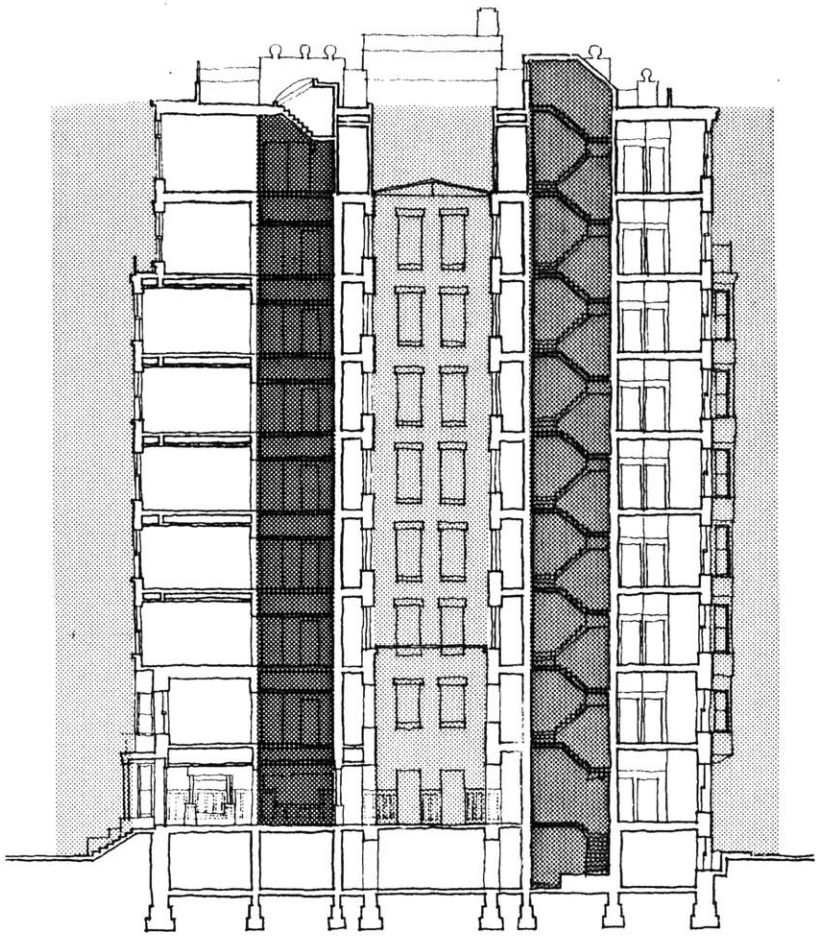
FLOOR PLAN: 416 MARLBOROUGH ST.

SPATIAL DIAGRAM: MARLBOROUGH ST.
Scale: 1/32" = 1'- 0"

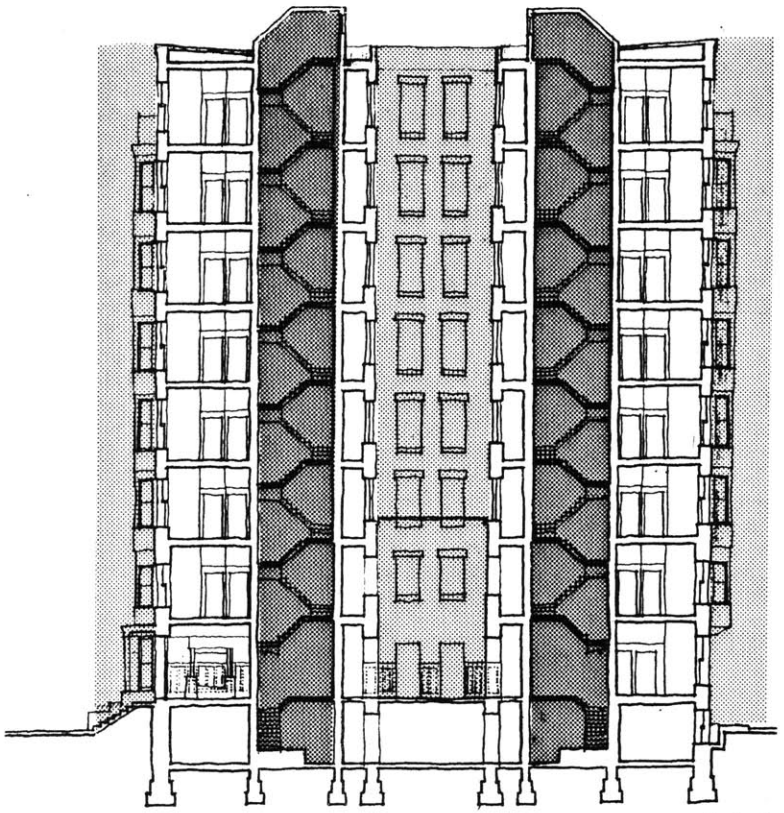
- lightwell/courtyard

- vertical access

- mechanical stacks

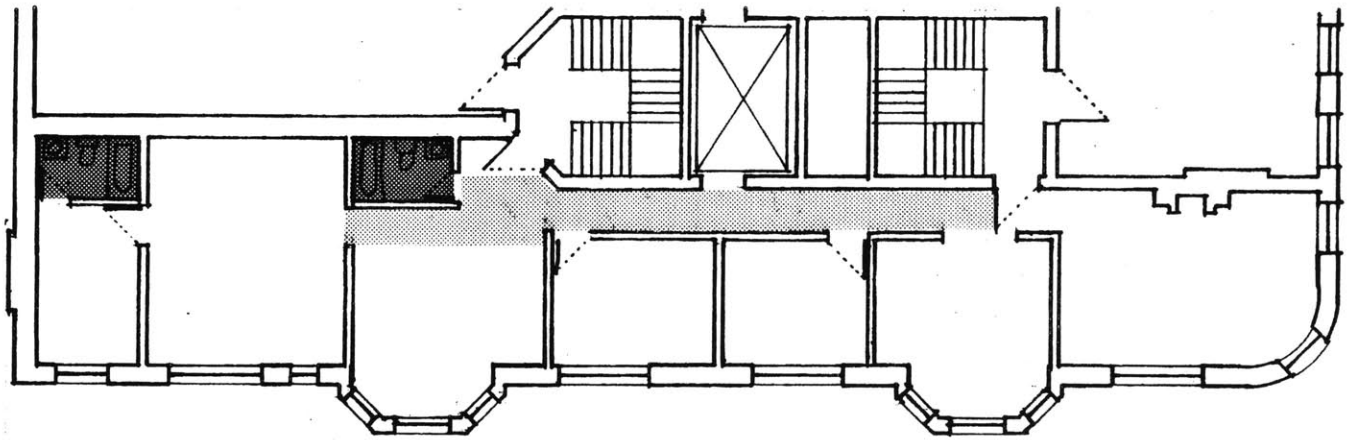


(before)

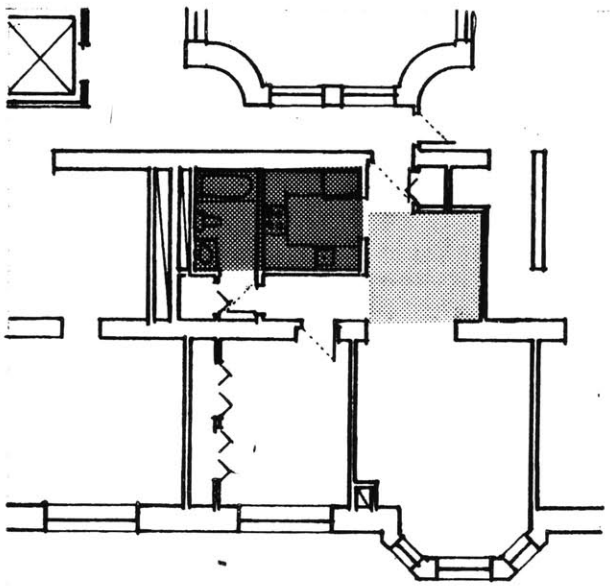


(after)

BUILDING SECTION: 416 MARLBOROUGH ST.



UNIT PLAN: 416 MARLBOROUGH ST. (before)



UNIT PLAN: 416 MARLBOROUGH ST. (after)

SPATIAL DIAGRAM: MARLBOROUGH ST.
Scale: 1/16 = 1'-0"

Berkeley St. building as example of the site as spatial organizer

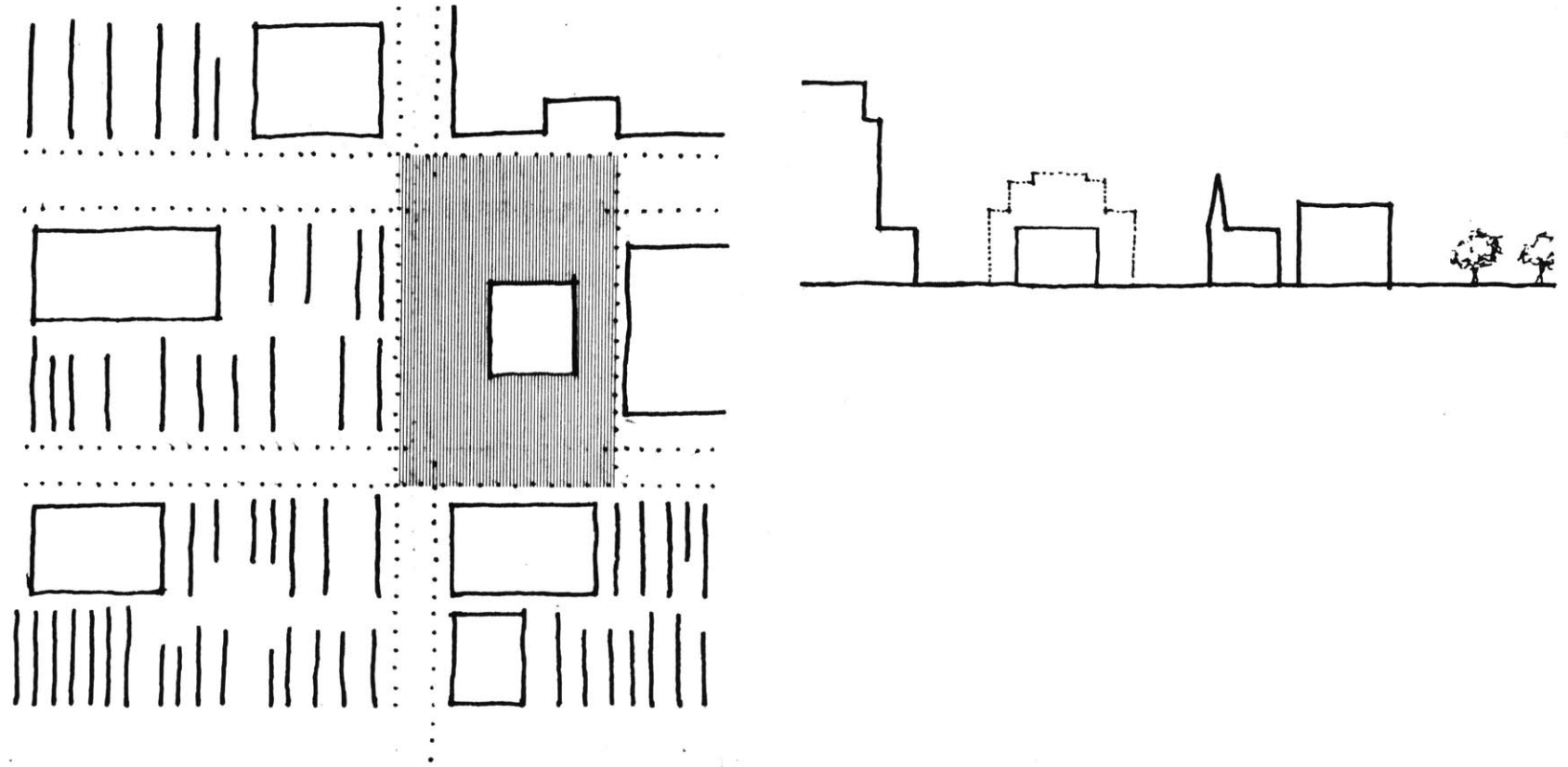
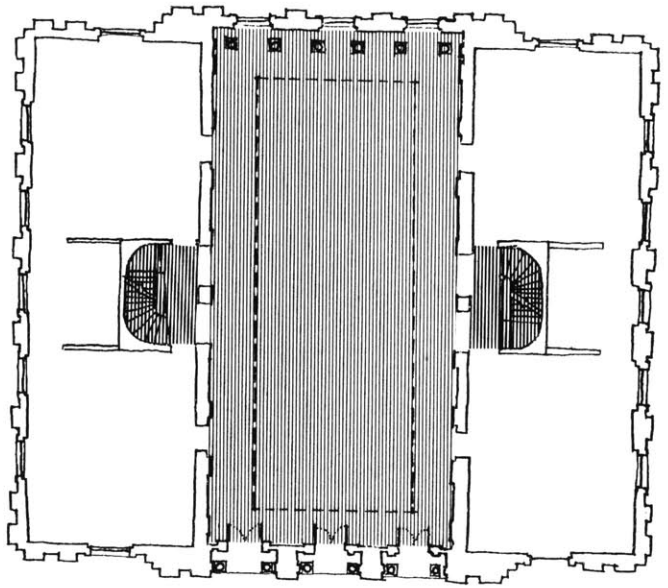


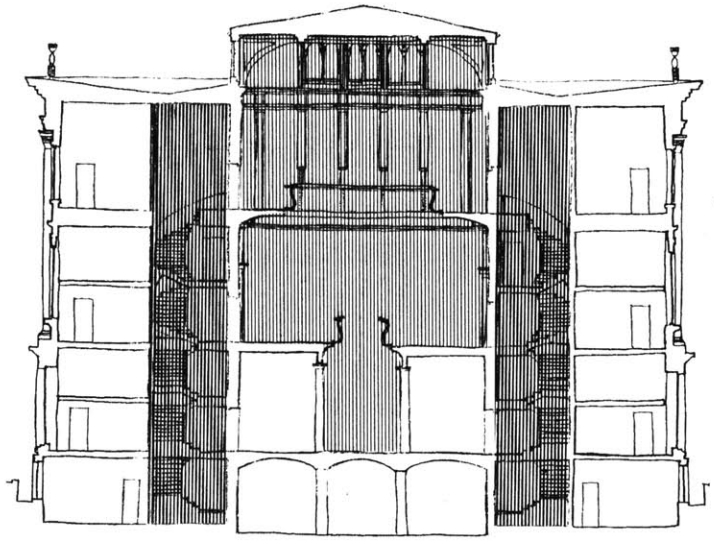
DIAGRAM OF BUILDING AND SITE AS LOCAL ORGANIZER

FLOOR PLAN: 234 BERKELEY ST.



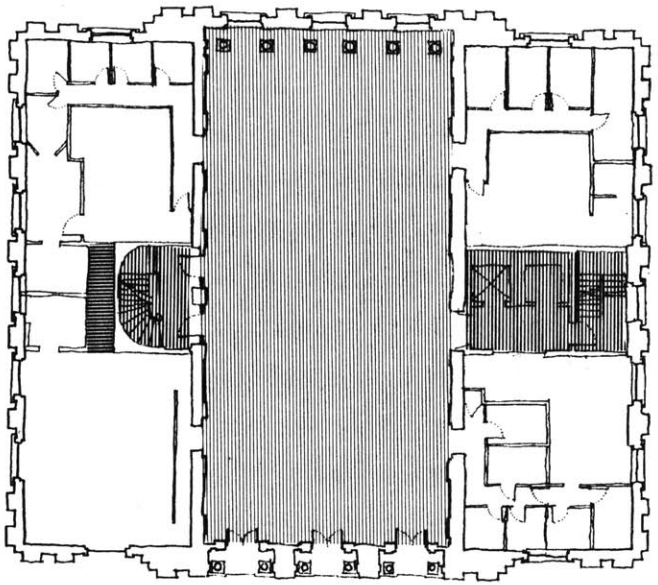
(Museum).

BUILDING SECTION: 234 BERKELEY ST.

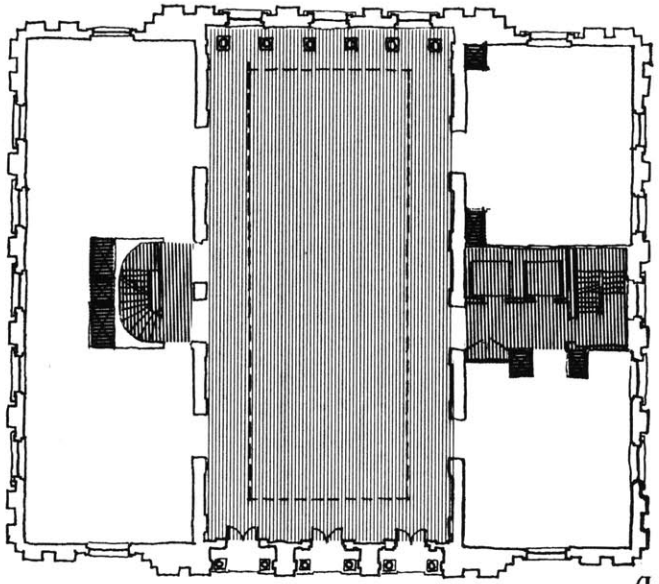


SPATIAL DIAGRAM: BERKELEY ST.
Scale: 1/32" = 1'- 0"

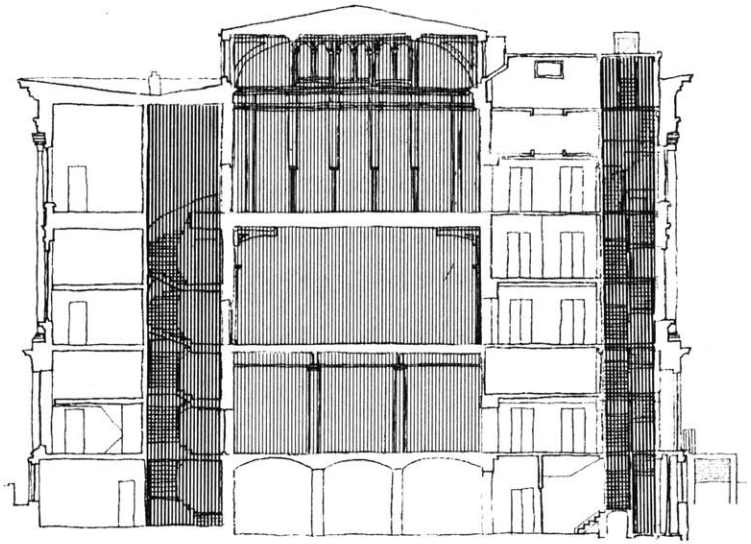
- lightwell/courtyard
- vertical access
- mechanical stacks

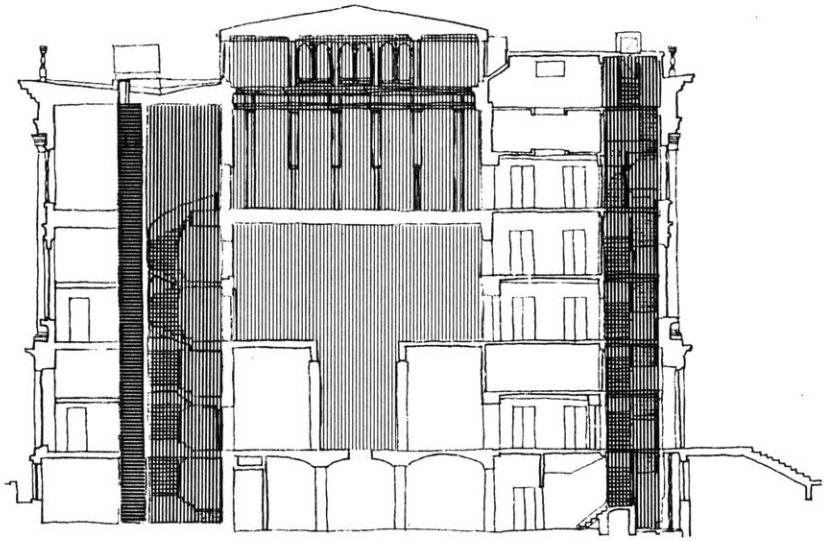


(Bonwit Teller)



(Louis of Boston)





STRUCTURE/CONSTRUCTION

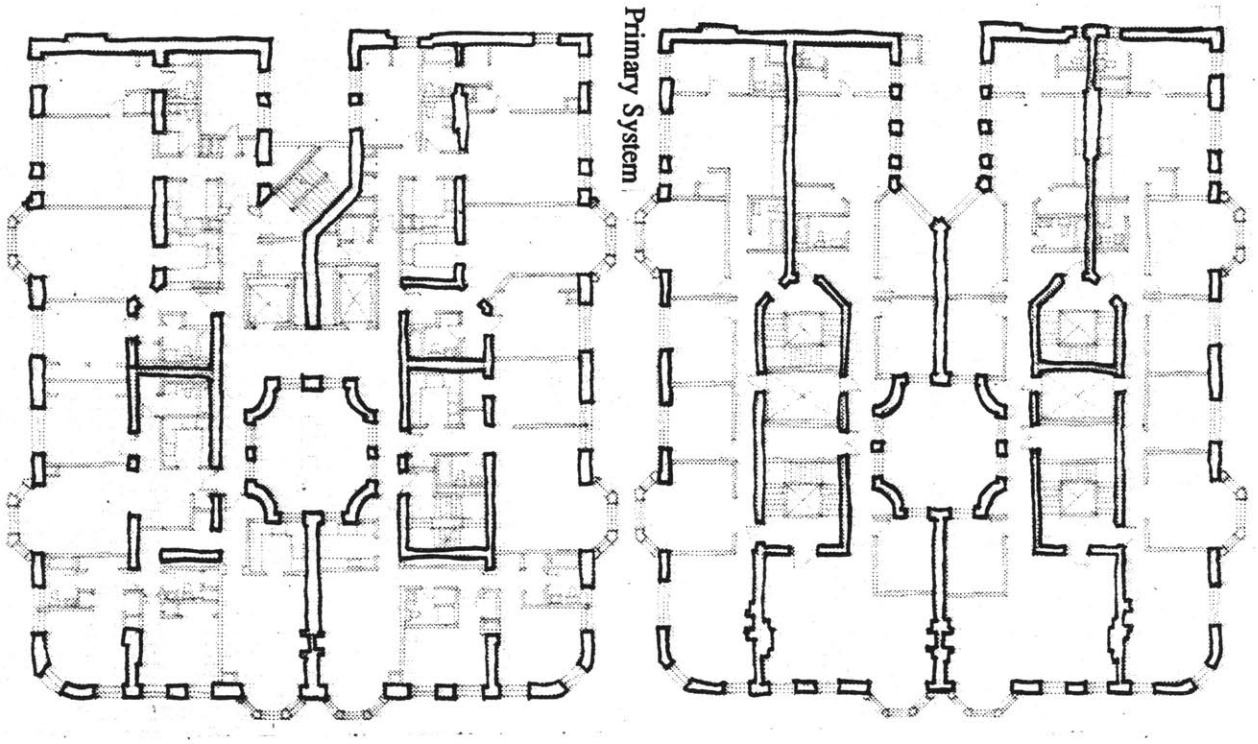
For the sake of analyzing the construction of the buildings, a hierarchy of permanence in the elements of a building might be described in terms of primary, secondary , tertiary and mechanical systems.The primary system is that part of the building which is linked to its structural stability. In other words special precautions and limits are imposed upon any action on this system as its removal or weakening could cause part or all of the building to collapse. The secondary system may be structural as well but are more local in their definition, generating privacies and use territories with elements such as partition walls or mezzanines. The finishes and closure of a building come under the definition of the tertiary system. Mechanical systems have received their own category as well and include such thing as H.V.A.C., plumbing, electricity, and elevators/fire stairs. As computer technology progresses accommodating the equipment necessary to run "smart buildings" may also become a part of this category. Certainly any piece of a system is not restricted to functioning in any single category,for example, a masonry wall can be structural while building a privacy and providing closure, but each system should maintain a clear role the majority of the time.

After classifying the elements of the example buildings with these definitions before and after their renovations, the degrees of permanence of each system corresponded for the most part to what one would expect,

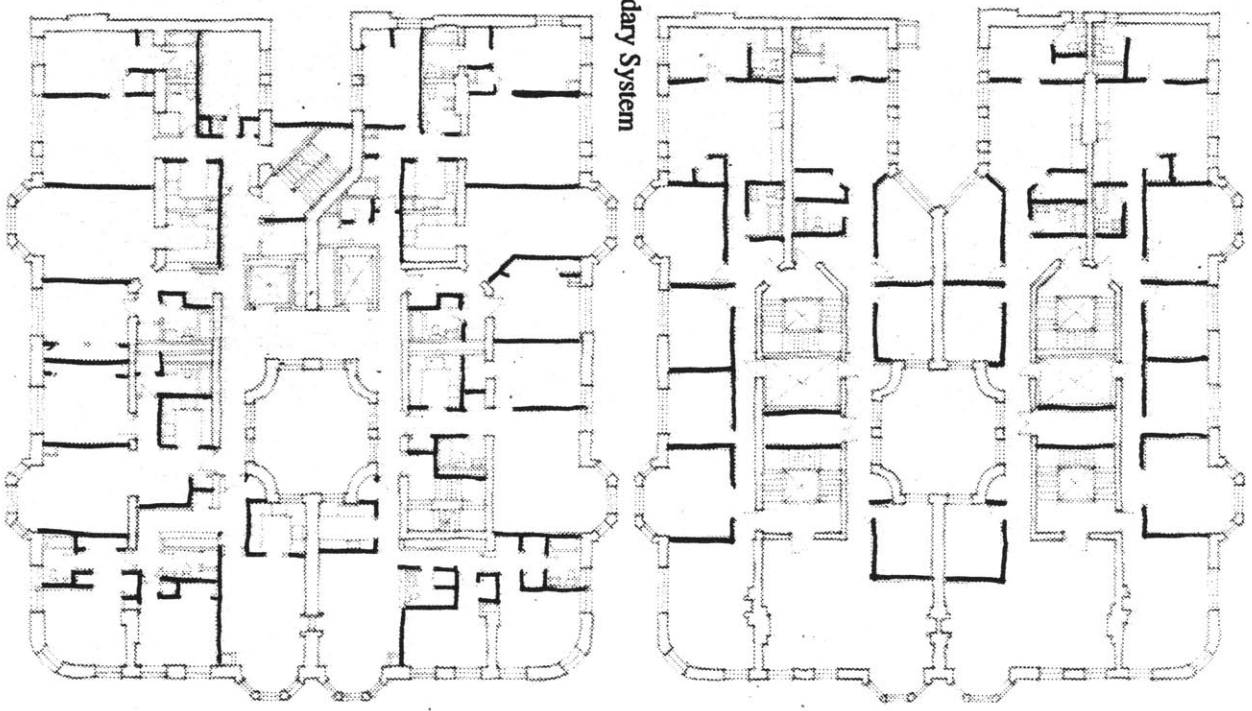
with the primary system showing minimal changes while the secondary system was almost completely replaced in both cases. Mechanical systems tended to be added rather than moved. One less obvious condition was that the closure system or exterior of the building tended to have the least amount of intervention, while the interiors were being completely reorganized. This also meant that the primary system was much less a factor in how the building was organized and that its influence related more to setting up dimensional relationships instead.

Deciding which elements are to be more 'permanent' than others and making that relationship clear is one method of directing the interpretation of a space. Which elements truly limit the decisions by the fact that to remove or move them would be more trouble than working around them? By using building systems which have some directive characteristics such as a directional span, or a tartan grid the interventions on the space by the user become *re*actions to some existing limitations. This will encourage ingenuity and, hopefully, improvement and enrichment of the built environment rather than minimal "start from scratch" solutions. The choice of materials and the way they are used also contributes to their sense of permanence. For example, brick is a material that most people would intuitively consider 'permanent' (ie. durable, strong, etc.). The interventions made on a load bearing wall will be considerably more restricted than those made on a brick veneer or infill.

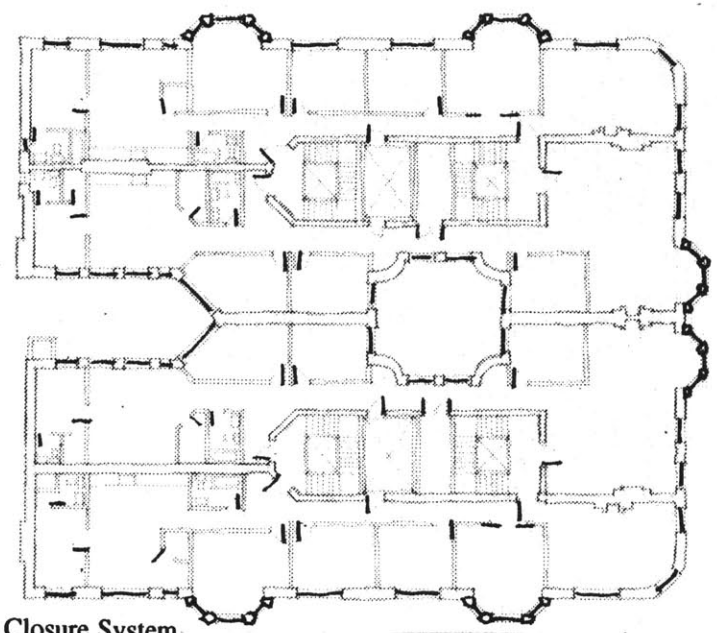
STRUCTURAL DIAGRAMS: MARLBOROUGH ST.
Scale: 1/32" = 1'- 0"



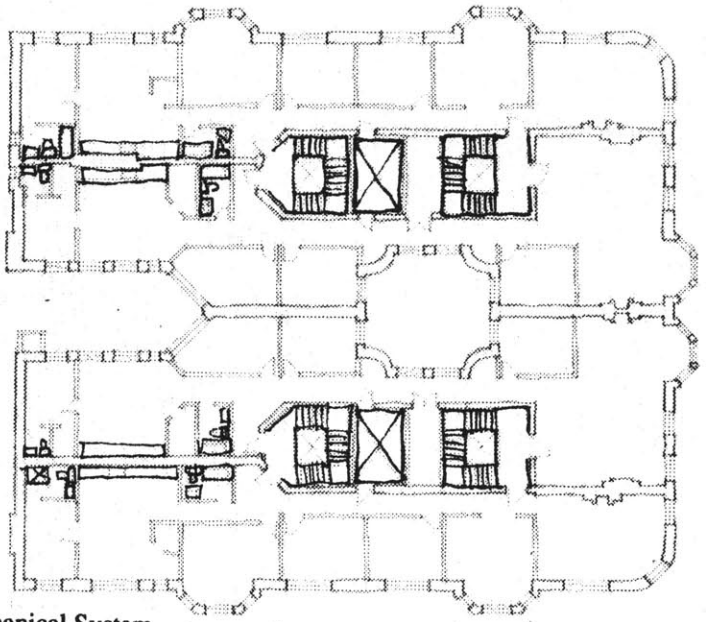
Primary System



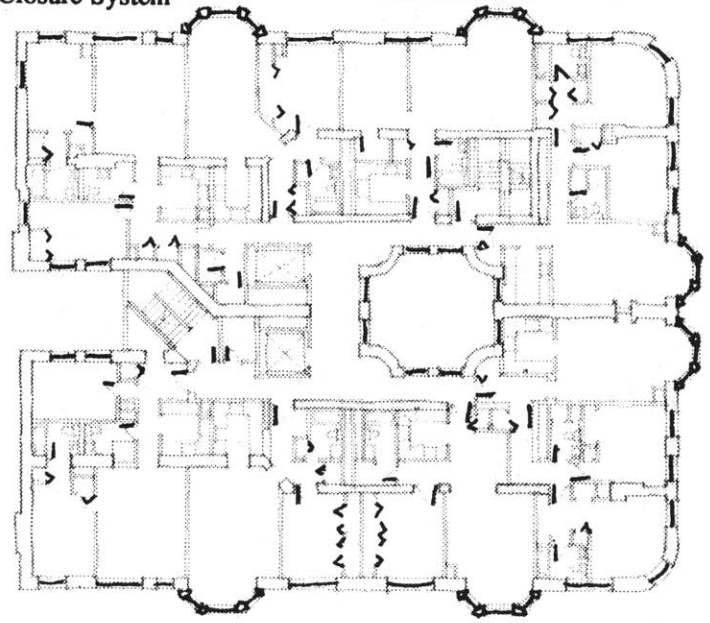
Secondary System

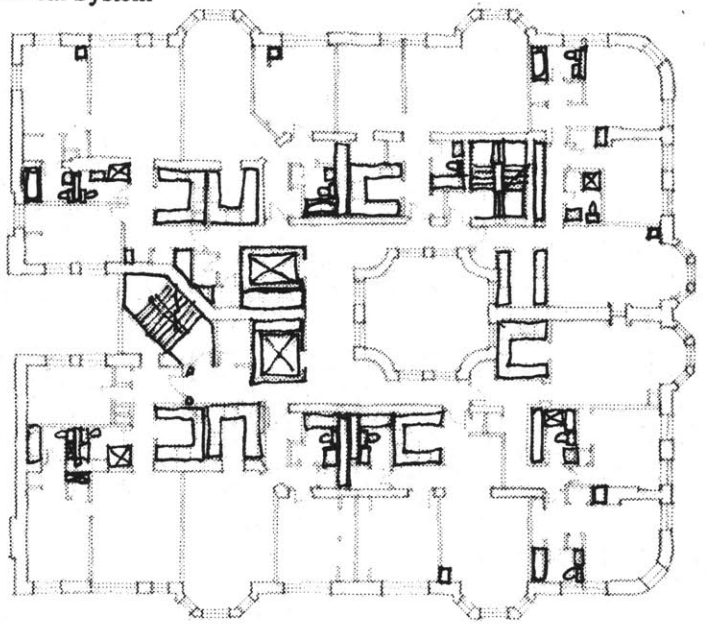


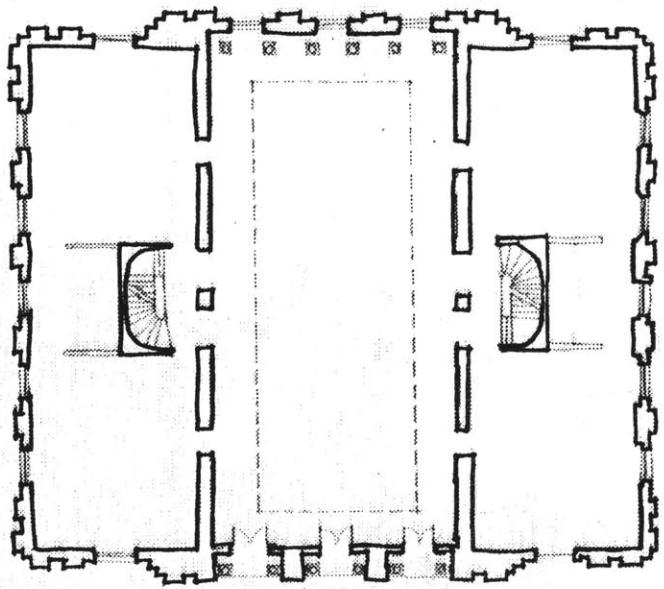
Closure System

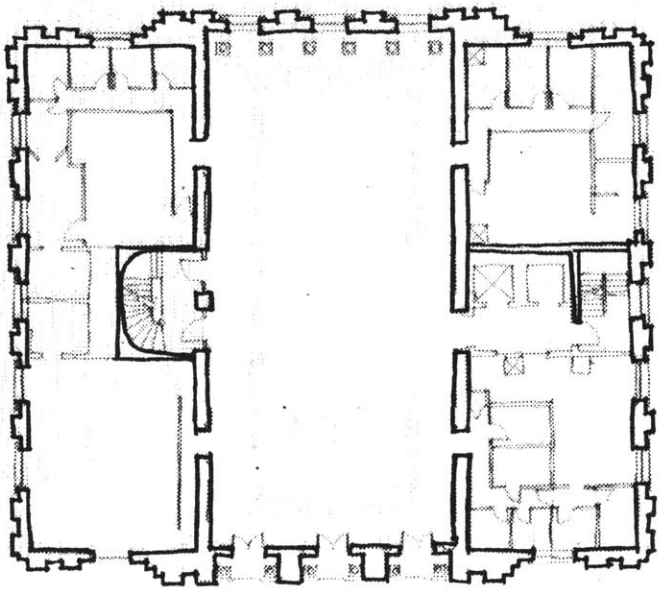


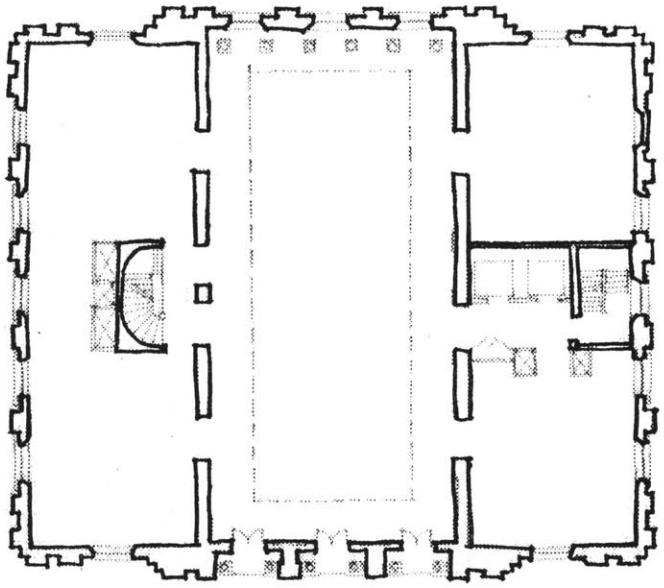
Mechanical System





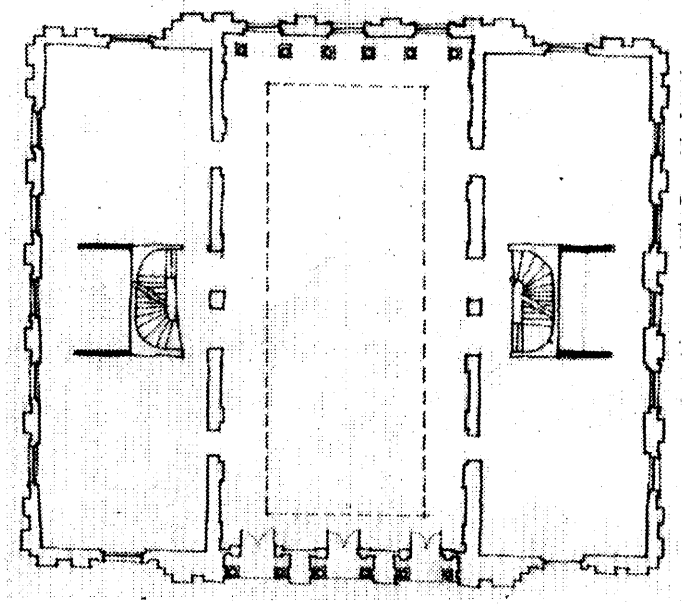


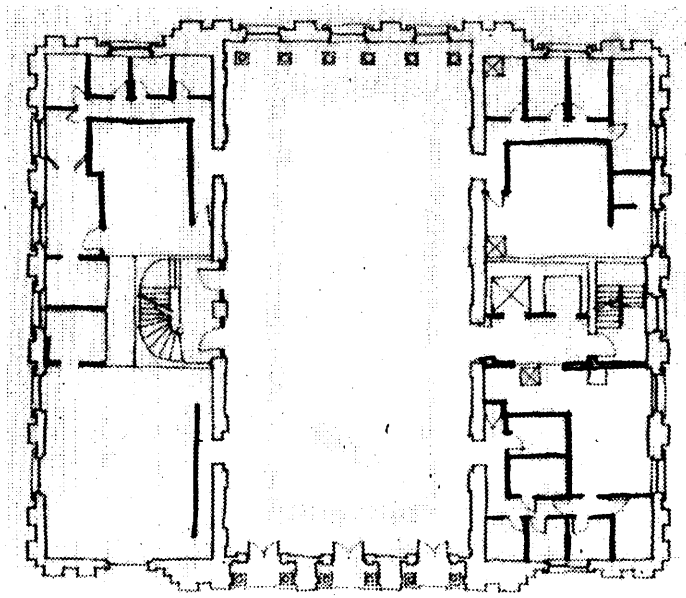


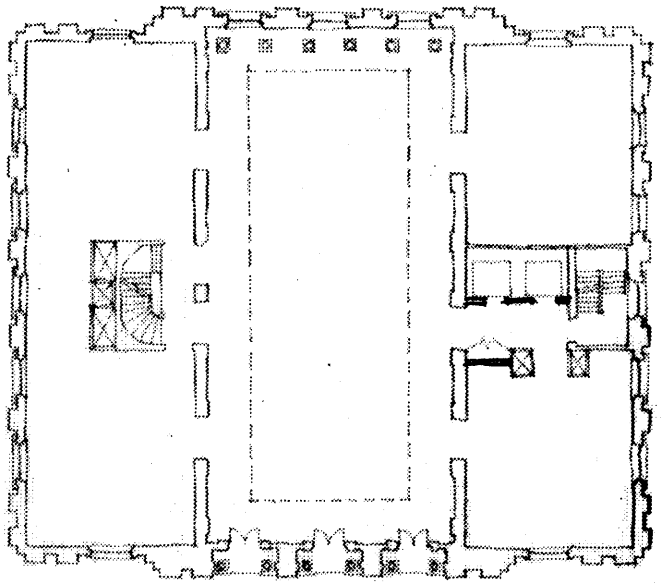


STRUCTURAL DIAGRAMS: BERKELEY ST.
Scale: 1/32" = 1'- 0"

Primary System

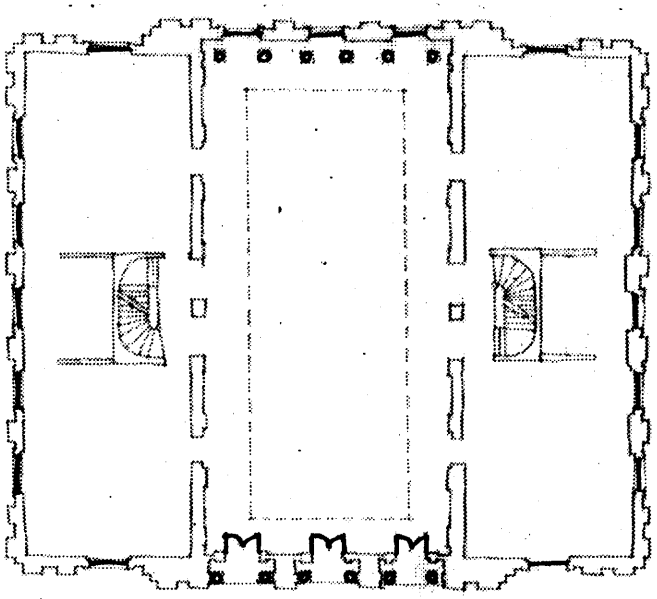


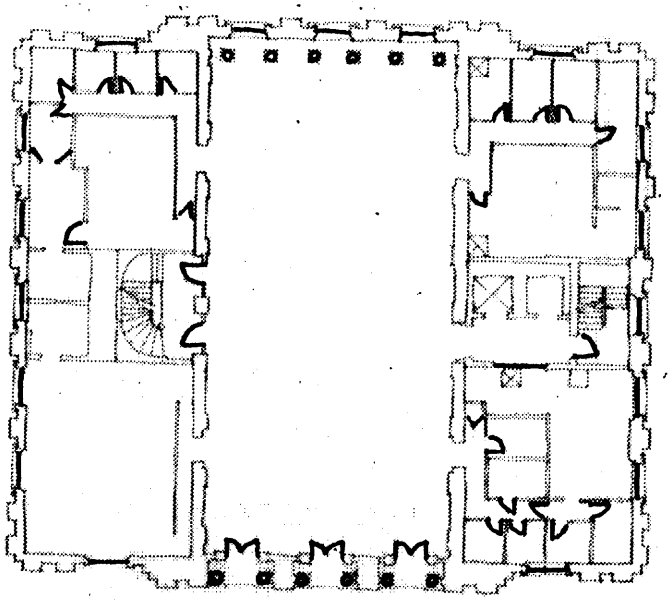


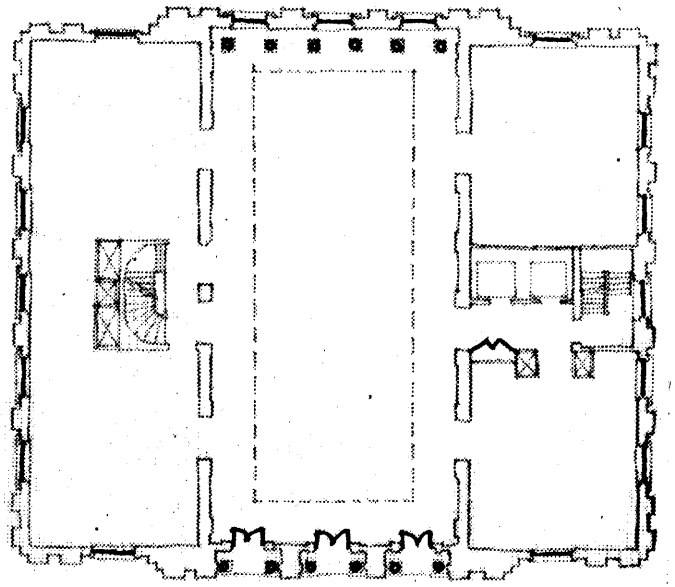


STRUCTURAL DIAGRAMS: BERKELEY ST.
Scale: 1/32" = 1'- 0"

Secondary System

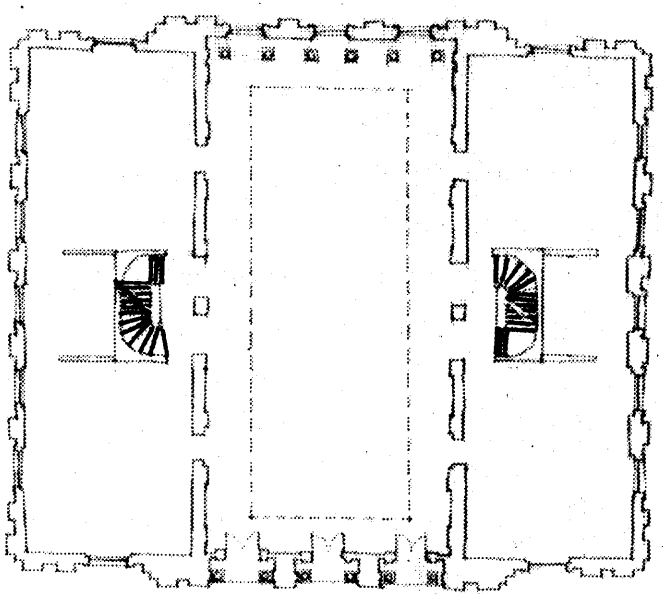


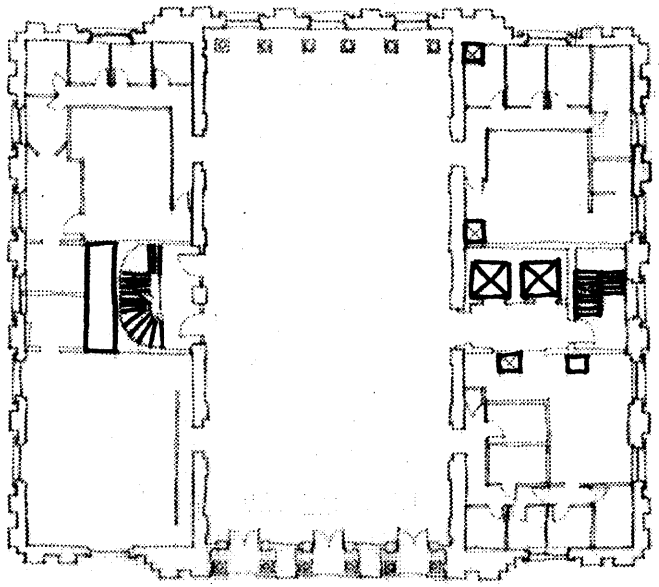


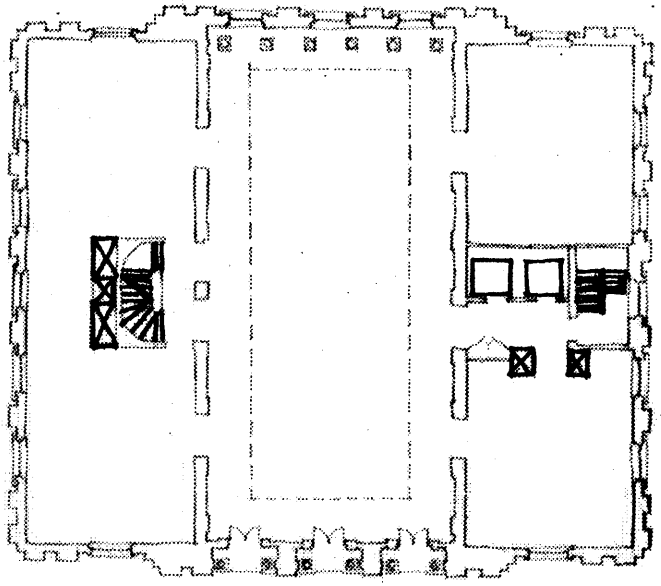


STRUCTURAL DIAGRAMS: BERKELEY ST.
Scale: 1/32" = 1'- 0"

Mechanical System







STRUCTURAL DIAGRAMS: BERKELEY ST.
Scale: 1/32" = 1'- 0"

Closure System

SUMMARY

And now to summarize and generalize the information that has been obtained through these analyses. Each category seems to be effective at a different scale. The access tends to be more permanent where it establishes the relationship of the building to the neighborhood, while the spatial organization's durability extends down to the building size, particularly at the vertical continuities. The structural influence of a building is in determining the sizes of the territories and use spaces. Each of these categories is then made particular through the dimensions and responses to location.

From these conclusions, the elements of a building which appear to be more permanent because they define and are defined by these enduring qualities at the crucial scale are the primary structure and the vertical organizers (including the mechanical stacks). The facade is probably the most durable element in the building as it defines the public / private relationship to the larger context. It also responds to the external conditions of dimension, form and environment as well as the internal organizers of vertical spaces and structural bays. Making these elements generic (ie. not overly specific or too neutral) and systematic (having understandable applications of use and form) will allow them to contribute to the possible interpretation in a more active manner without making the definitions overly restrictive.

Certainly none of these categories alone are sufficient to generate a richness of definition in a building. The built environment was broken down into these topics for the sake of the analysis in the hope that by understanding the parts one might come closer to understanding the whole. "When we find ourselves already separated from the environment we live in we must, inevitably, examine what we are separated from to come to terms with it once more."[1]

---

[1]Habraken, Transformations..., p. 55.

"Whatever space and time mean, place and occasion mean more - for space in the image of man is place and time in the image of man is occasion . . . By virtue of what memory and anticipation signify, place acquires temporal meaning, and occasion spatial meaning. Thus space and time identified reciprocally (in the image of man) emerge, humanized as place and occasion. Places remembered and places anticipated dovetail in the temporal span of the present. They constitute the real perspective of space."

Aldo Van Eyck


Bernauer Straße
Wolliner Straße

Having come to some conclusions about the scale at which the various analysis categories are more permanent and therefore the scale at which the majority of effort might be applied in deploying these systems, it is time to make these generalizations specific by applying them to the design of a building for a particular site and in the process, perhaps, make architecture.

Responses to the Site Based on Analysis

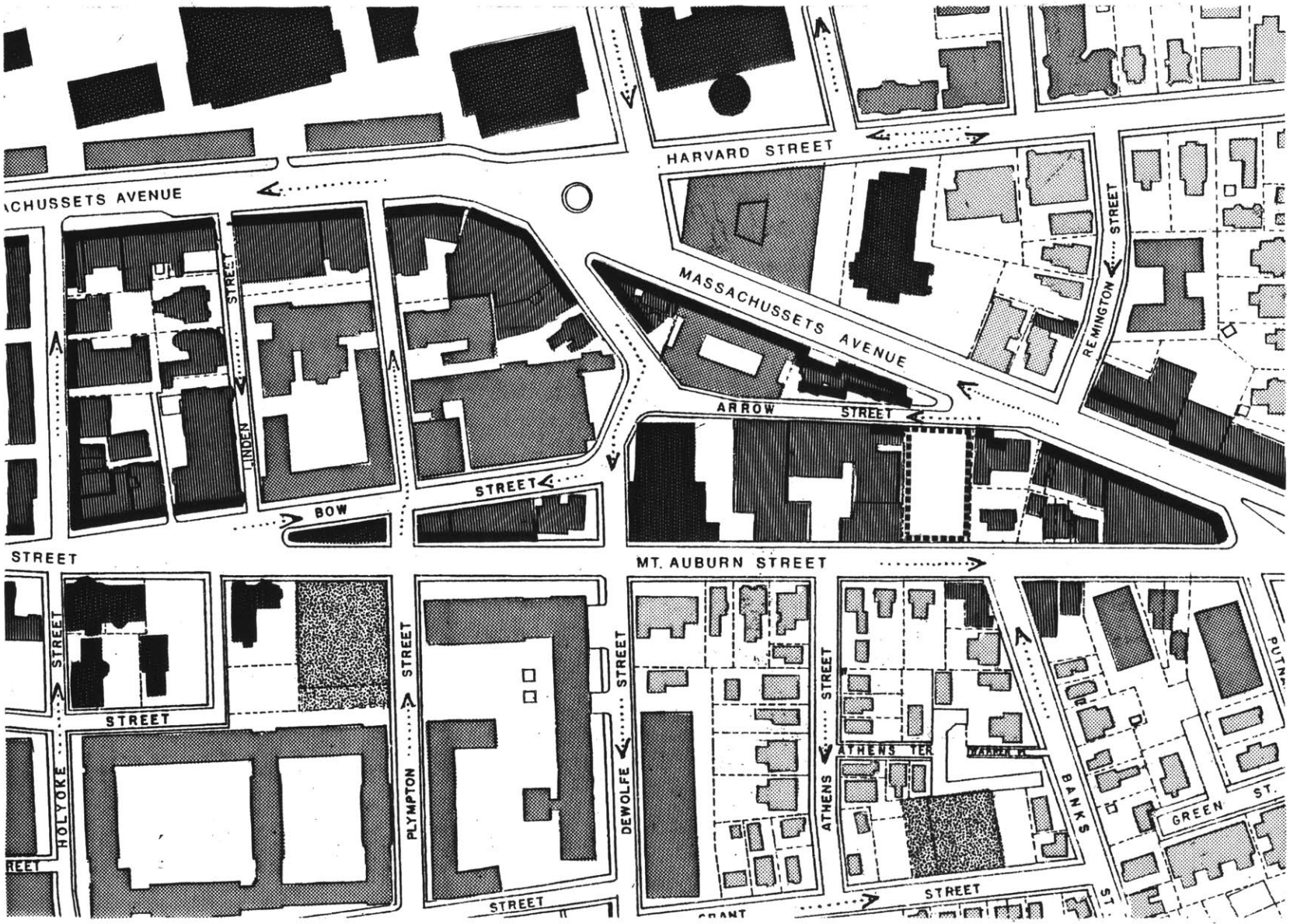
A general guide in applying these principles seems to be to establish some strong initial decisions with each element of the built environment at the scale that it seems to contribute the most to the longer term concerns of the building which are very site specific in nature. These larger scale interventions would then establish a formal hierarchy in which the big moves would be strong enough to inform and support a variety of smaller, more individual decisions while maintaining the chosen relationship with the larger context.


SALE

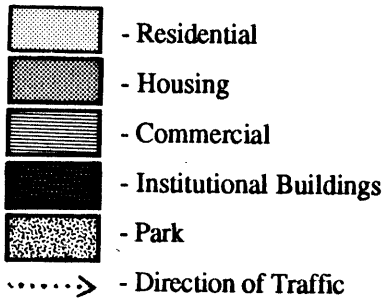
"0" Arrow St. from Massachusetts Ave.

THE SITE

The site will remain a relatively reliable constant among the elements which compose the built environment. Its changes are somewhat predictable if not always controllable. This includes more immediate changes of season and weather as well as longer term concerns of erosion, growth, and shifts in the natural environment. Even some of the less predictable acts of nature, such as earthquakes and hurricanes, can be anticipated in areas where they occur with relative frequency. Within the boundaries of the given site, there is also control over the form of that environment. It seems reasonable to exploit these qualities of the site in an effort to enhance its ability to make unique contributions to the built landscape.


HARVARD STREET
ACHUSSETS AVENUE
MASSACHUSSETS AVENUE
REMINGTON STREET
LINDEN STREET
ARROW STREET
BOW STREET
STREET
MT. AUBURN STREET
STREET
STREET
HOLYOKE
PLYMPTON STREET
DEWOLFE STREET
ATHENS STREET
ATHENS TER
BANKS
GREEN ST.
STREET
STREET
GRANT

LOCATION DIAGRAM: "0" ARROW ST.
Scale: 1" = 200'- 0"



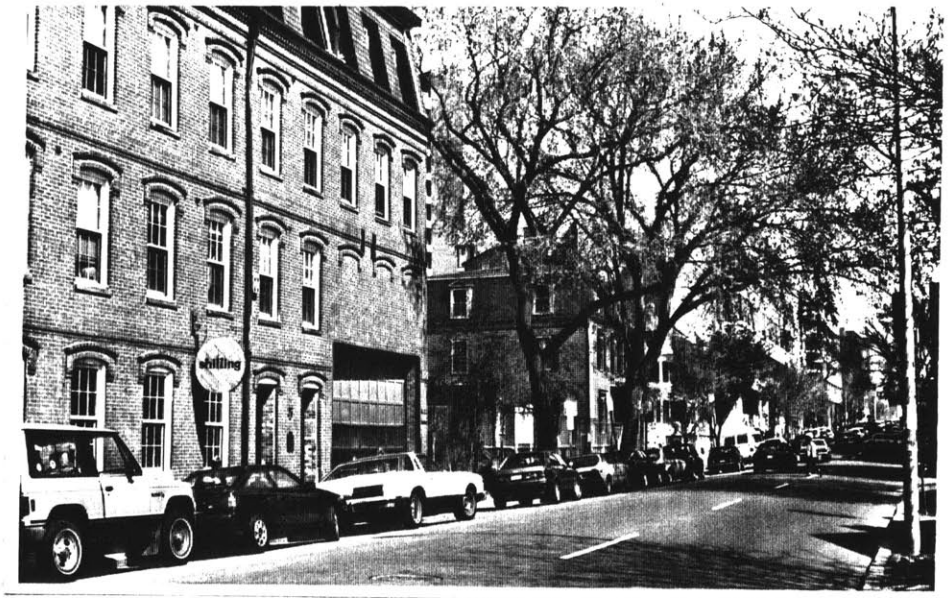
The site chosen for this design is '0' Arrow Street in Cambridge, Massachusetts, located at the intersection of Arrow Street and Massachusetts Avenue and extending from Arrow Street, through the block to Mt. Auburn Street. Massachusetts Avenue is the main commercial street running through Cambridge and extending on in both directions; south to Boston and north to Arlington. Here it has become a one way street moving north through and beyond Harvard Square. Mt. Auburn Street is also a one way primary street moving south. It often serves as the transition between commercial areas and residential neighborhoods. At this particular point it is mostly made up of office buildings with larger residential buildings and some retail. Less than a block to the southeast Mt.Auburn merges with Massachusetts Avenue making it a two way street again. Arrow Street on the other hand is a smaller side street lined with mixed use buildings and ending at St. Paul's Catholic Church, with its land mark tower, and a Harvard dorm at its far end.

Massachusetts Ave. looking toward the site from intersection of Mt. Auburn St.

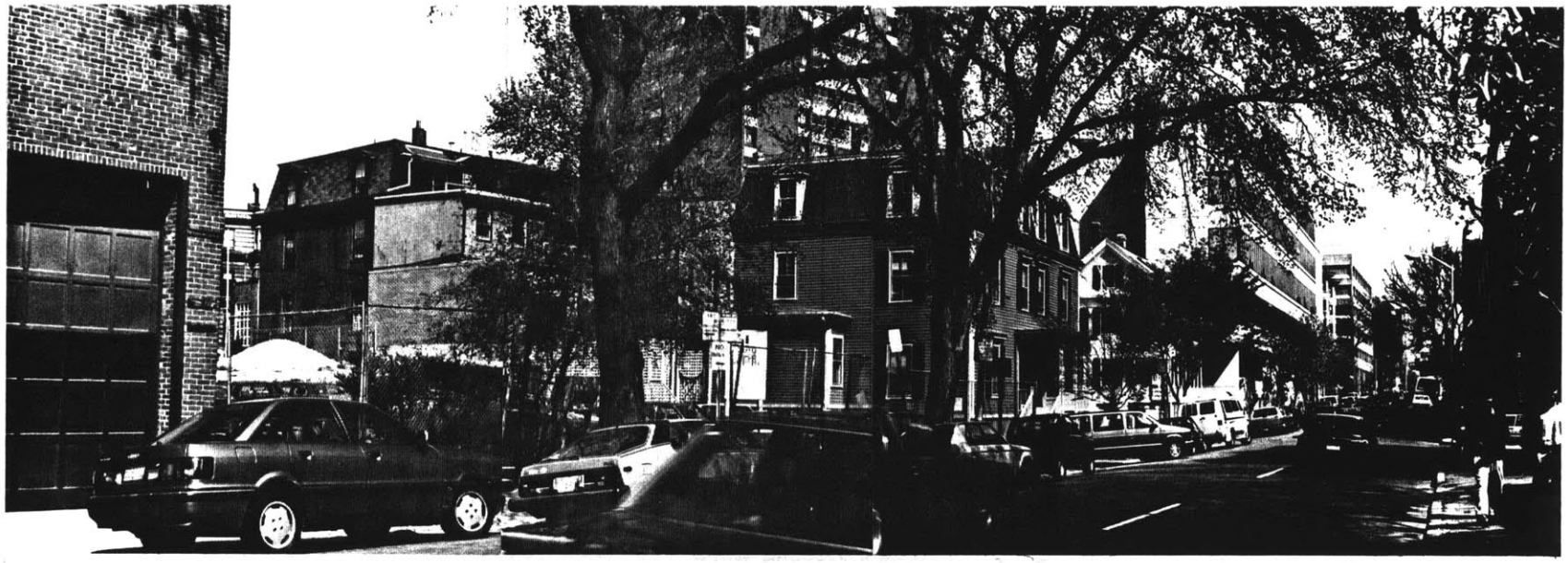
Massachusetts Ave. from front of of church toward intersection of Mt. Auburn St.

Buildings across Massachusetts Ave. from site.

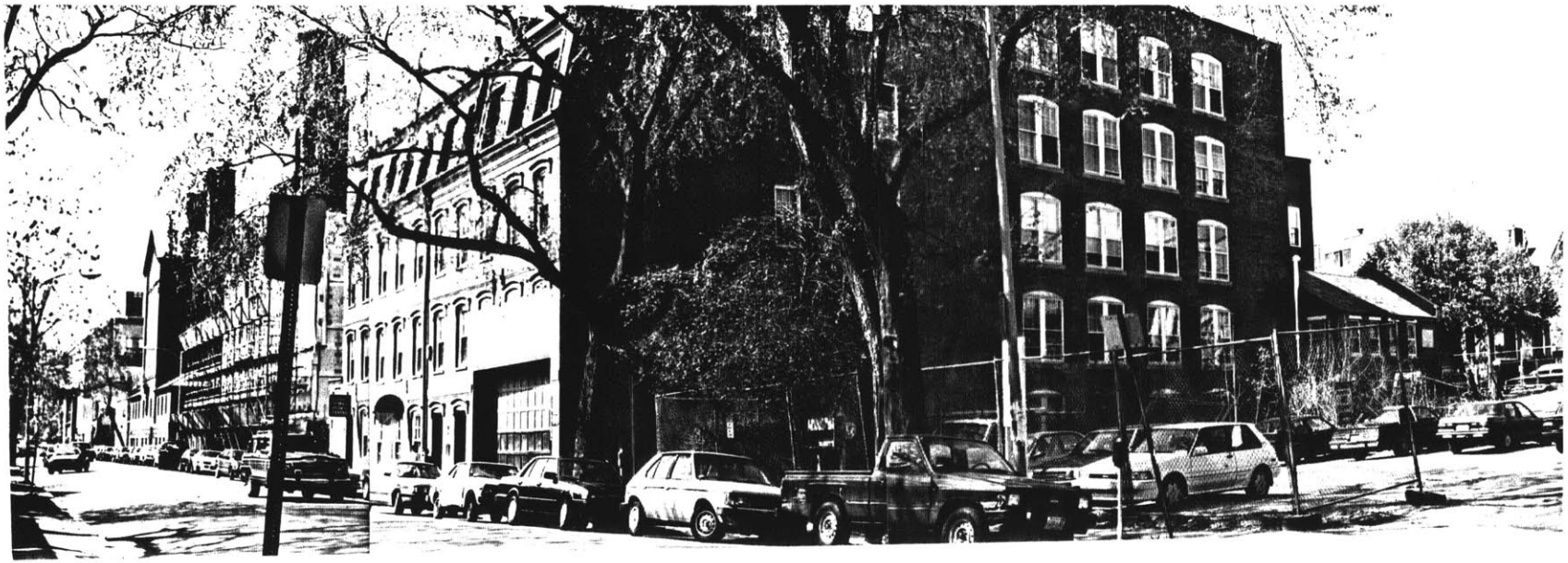
Street edge along Mt. Auburn including site.



Street edge along Arrow St. including site.



Mt. Auburn St. looking toward Massachusetts Ave.
intersection.



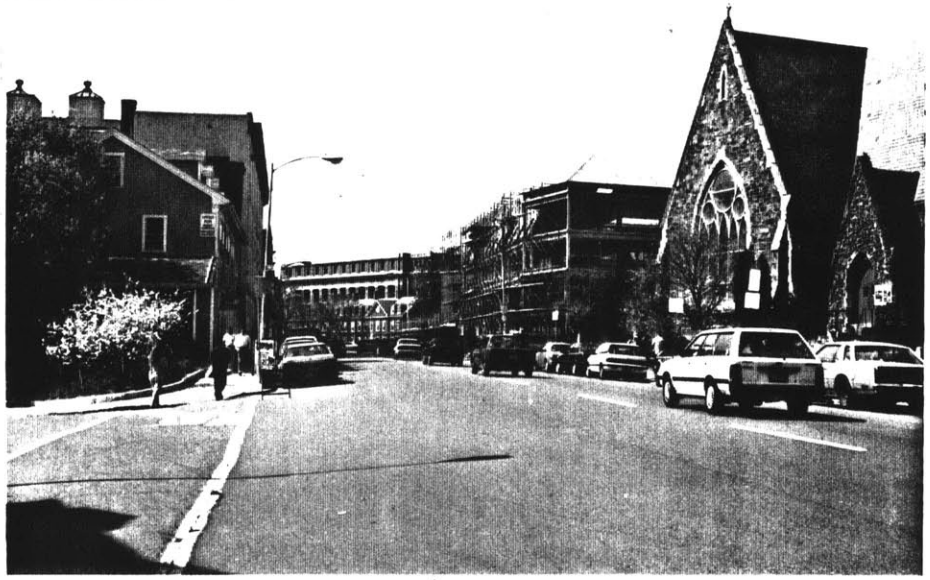
Brick warehouse at west property line.

Large window wall at center of west edge of site.

Looking through site from Mt. Auburn St. to Massachusetts Ave. shows level change.

The site itself has several unique qualities and restrictions. For example there is an eleven foot drop in the site from Massachusetts Avenue to Mt. Auburn Street. To the west it is bordered by an old brick warehouse building containing mostly offices and some retail at street level. Its facade varies greatly as it moves from south to north beginning with a fire wall extending one third of the way into the site. This is followed by an almost equal expanse of wall with six stories of windows ending with a funny two story appendage at Arrow Street with a gable roof which will require special attention at that corner to accommodate the change in scale and form.

Planted peninsula at intersection of Massachusetts Ave. and Arrow St.

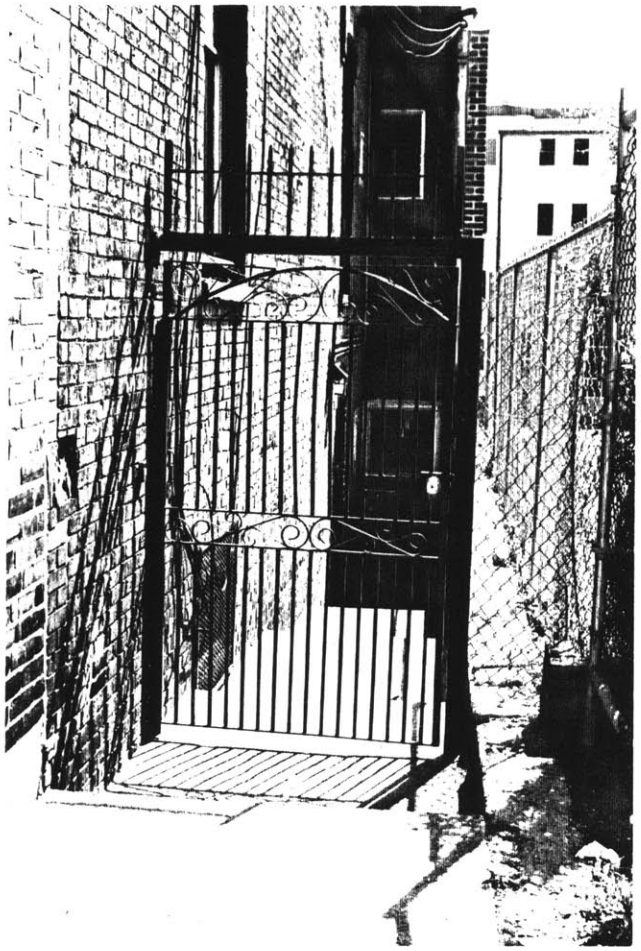


Massachusetts Ave. looking west.

Massachusetts Ave. looking east.

Across the street to the north is a planted peninsula which fills the branching of the 'Y' made by Massachusetts Avenue and Arrow Street. This smooths a second rise in elevation which allows retail uses to exist at street level on two floors with offices in the two floors above. Across Massachusetts Avenue are residential and commercial buildings and perhaps more significantly, an older stone church with ornate slate roofs which offers a break in the density built up along the rest of the street.

East Border of site, from Massachusetts Ave.



On the northeast corner of the site are three brick row buildings with bays, mansard roofs, and split access from the street, which contain office and retail uses. They were residential at one time. At the wall bordering the site the rear half is fire wall and can therefore be abutted. There is a small path, however along the front half which must remain to allow access to a basement unit from the street.

Alley way for brick building at east edge of site.

Massachusetts Ave. street edge at site.

Wood frame buildings at southeast corner of site.

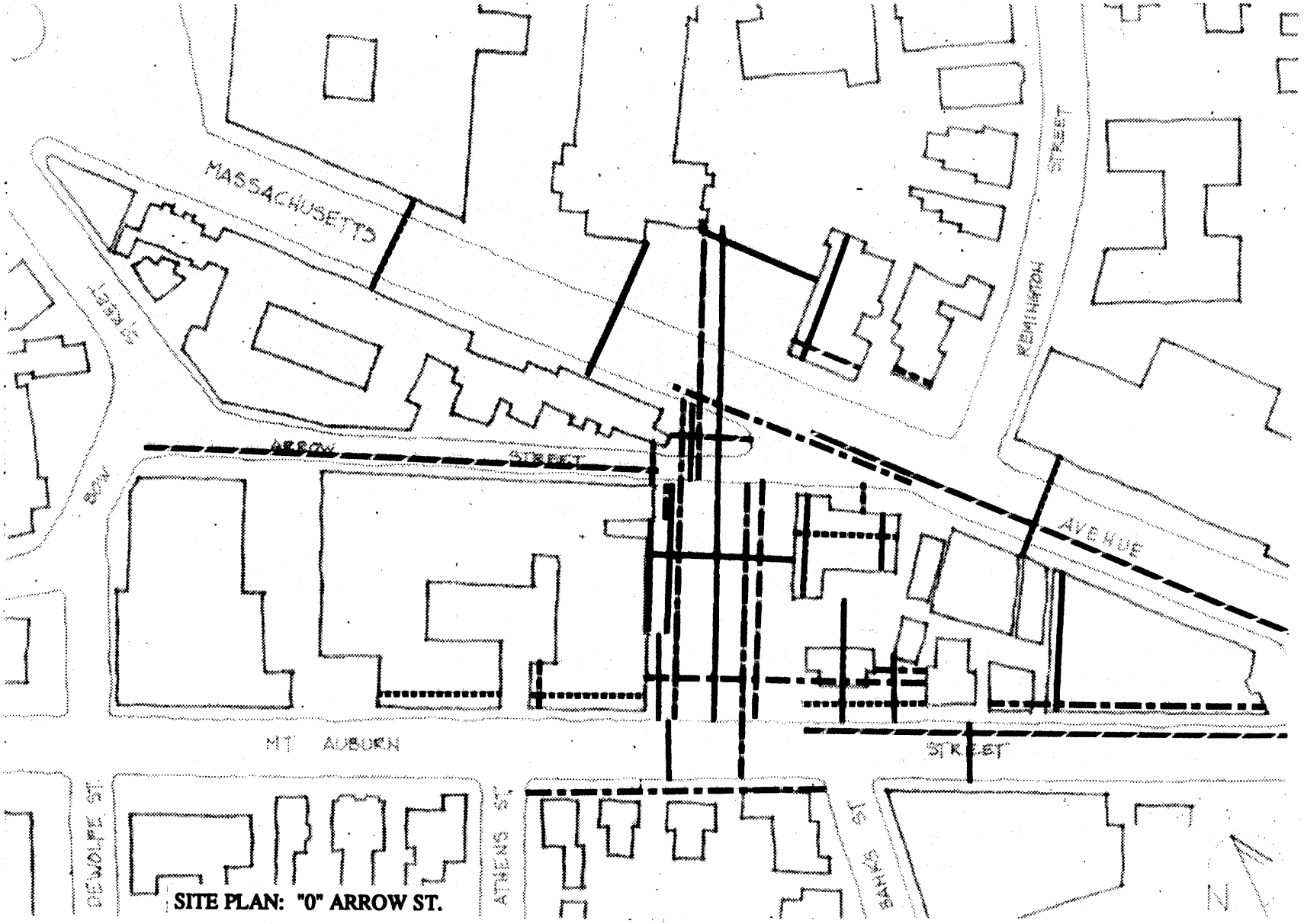
Southeast corner of site showing deck at back of converted house.

Finally, at the south east corner of the site are three single wood frame houses which have been converted into office space. These are organized around a shared planted exterior space to the back with screens and a deck and a brick paved area to the front. These therefore present a problem similar to that of the adjacent corner where the change in scale, form and construction will require that the new intervention leave some space to allow the shift to occur.

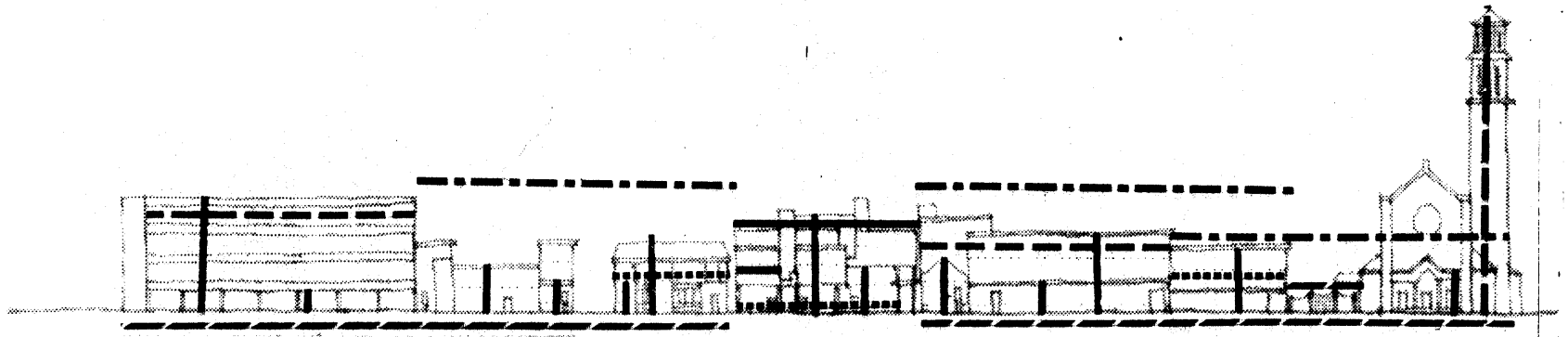
LOCATION: Reveal difference in elevation between Massachusetts Avenue and Mt. Auburn Street in the building section.

Direction of sun from Mt. Auburn Street side in general.

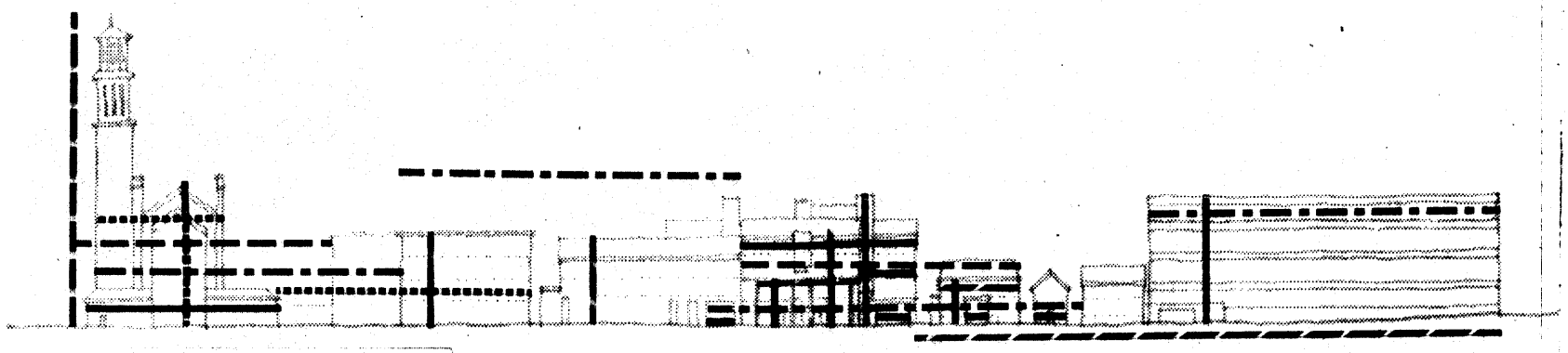
Respect window walls and access needs of adjacent buildings.



SITE PLAN: "0" ARROW ST.



ELEVATION ALONG MASSACHUSETTS AVE.

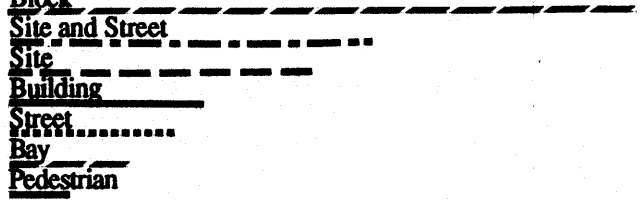


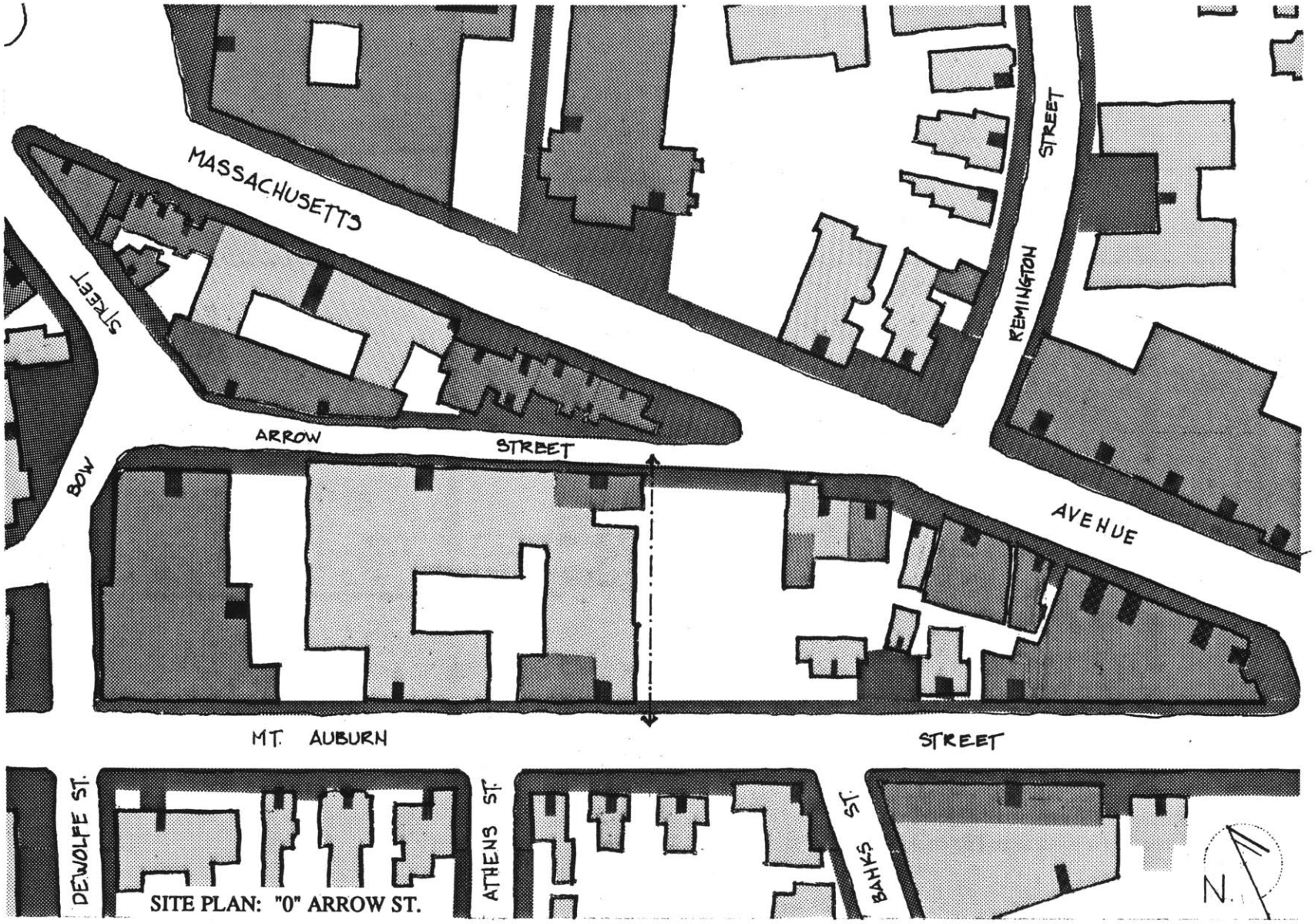
ELEVATION ALONG MT. AUBURN ST.

DIMENSION: Building could be up to 50 or 60 feet in height in relation to other Arrow Street buildings, but should not overwhelm the smaller structures on adjacent lots.

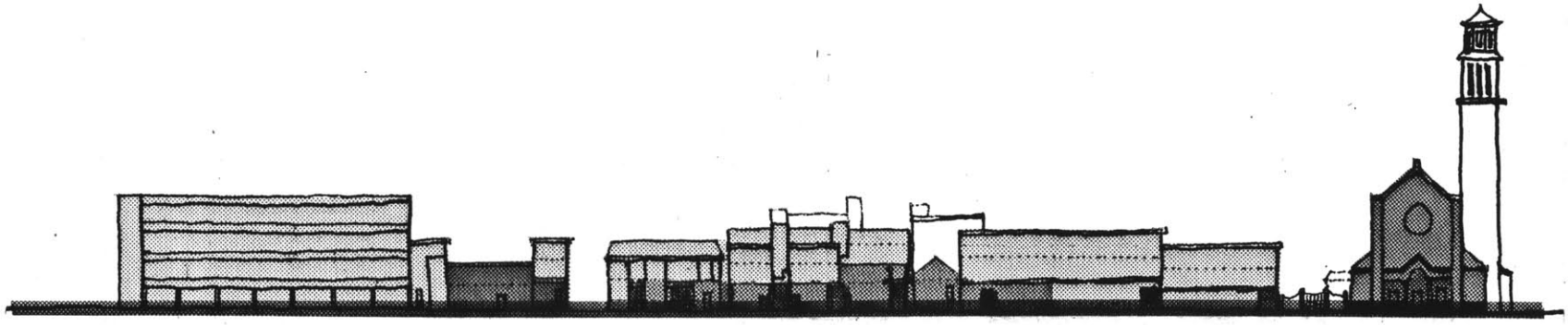
Dimensions of bays and elements of neighboring buildings might suggest some sizes that could be used.

DIMENSIONAL DIAGRAMS: "0" ARROW ST.
Scale: 1" = 100'- 0"

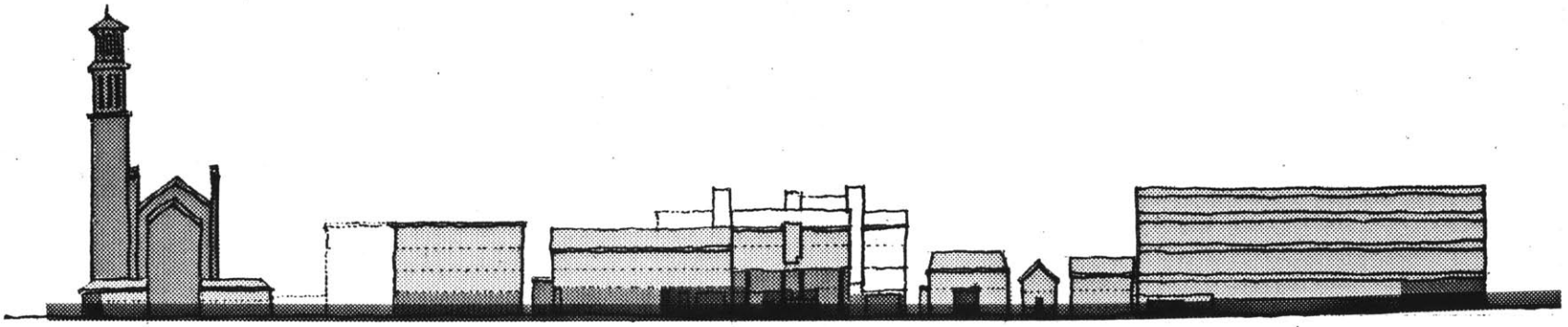




SITE PLAN: "0" ARROW ST.



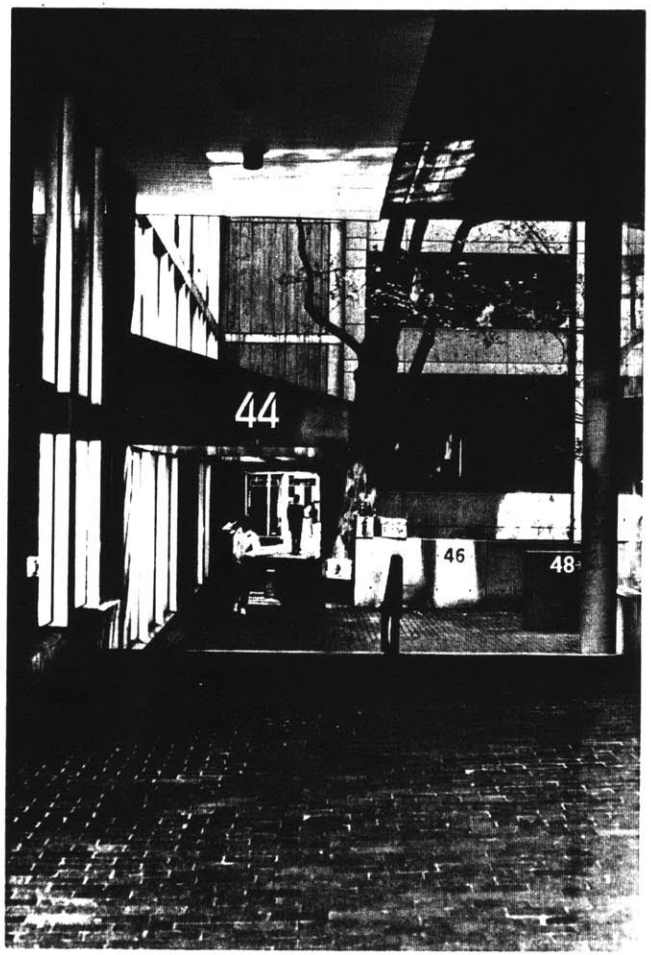
ELEVATION ALONG MASSACHUSETTS AVE.



ELEVATION ALONG MT. AUBURN ST.

ACCESS DIAGRAMS: "0" ARROW ST.

- Public
- Semi Public
- Private



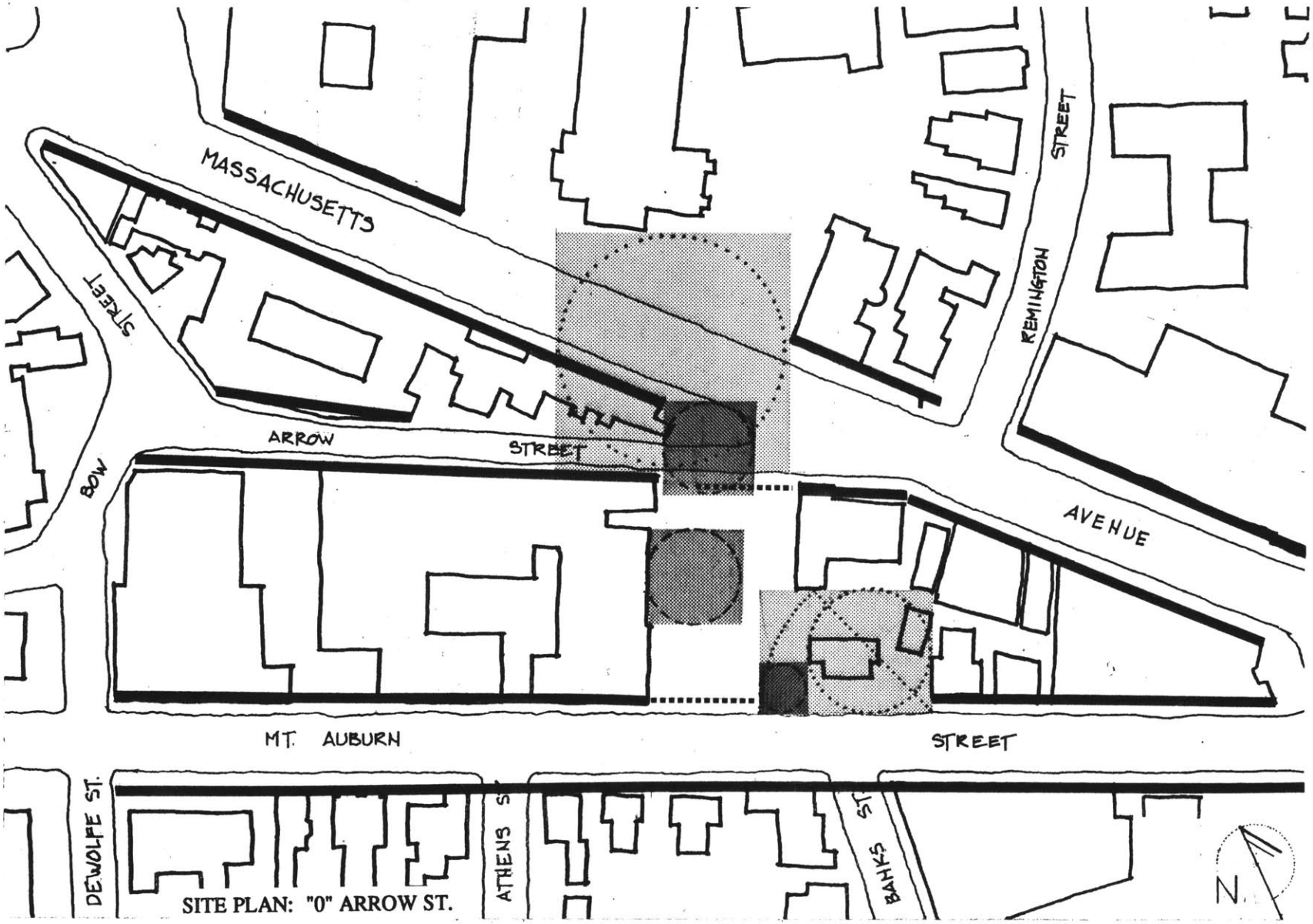
Public access through 44 Brattle St., Cambridge, MA

Retail at street level along Arrow St.

ACCESS: Massachusetts Avenue is generally more public and active and therefore may be considered front of the building.

Street level spaces should be treated as public and therefore be directly accessible from the street.

Direct access through site which also provides entry to less public uses above street level.



SITE PLAN: "0" ARROW ST.

Peninsula to be spatially included in the site.

SPATIAL DIAGRAMS: "0" ARROW ST.

- Existing spaces to be completed
- proposed spatial organizers particular to site.
- Existing street edge.
- Proposed street edge.

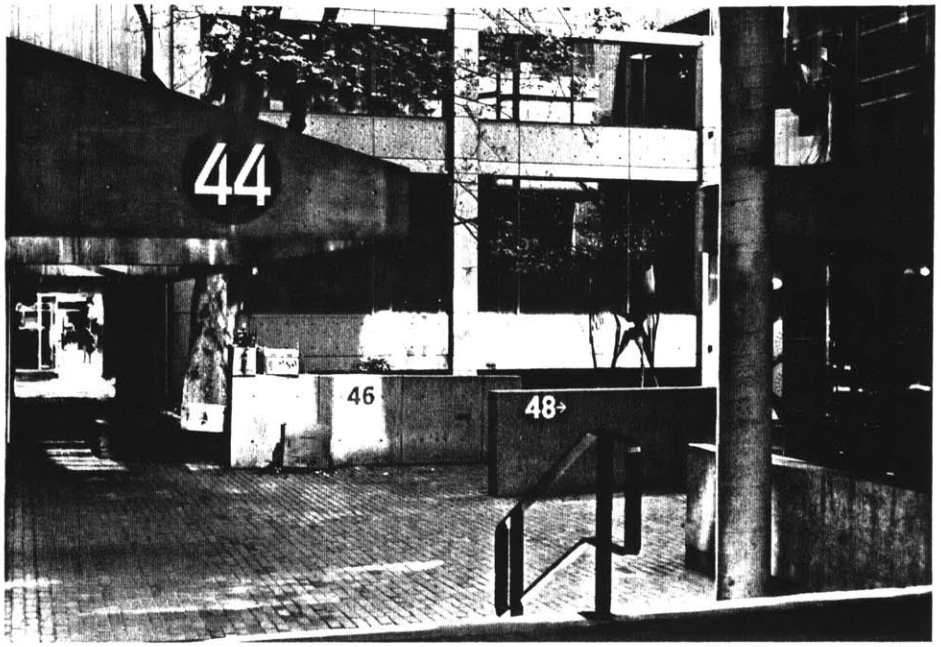
SPATIAL ORGANIZATION: At the neighborhood size building should help complete definition of street edge at both ends of the site.

At Massachusetts Avenue, allow planted peninsula across street to be spatially influenced by building to encourage and build street edge continuity.

Leave exterior space at west edge of site to allow light to reach window wall of neighboring building and provide a building size vertical organizer.

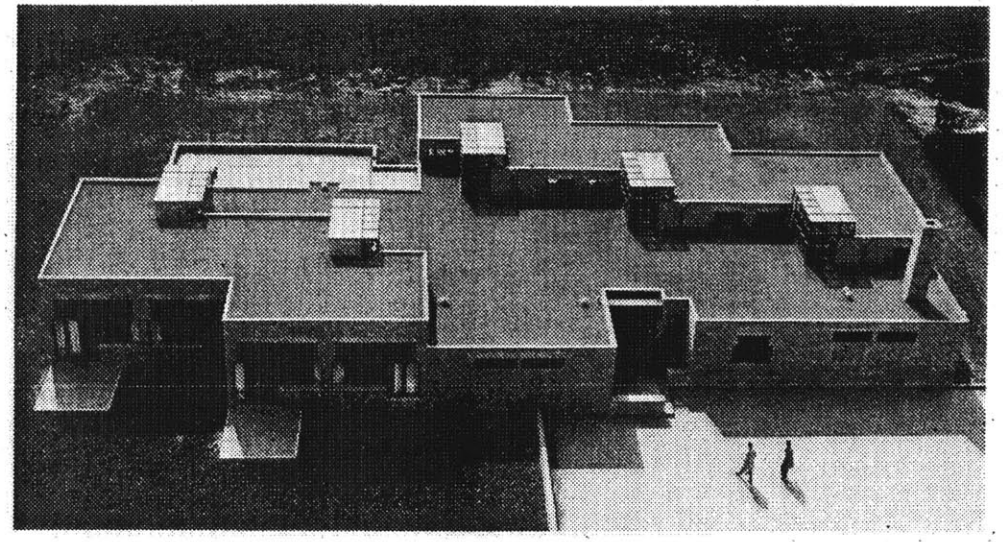
Leave space at east corner of Mt. Auburn Street to allow for change of scale and form of adjacent buildings.

Use vertical continuities such as stairs, lightwells, and plumbing, within building to help suggest possible inhabitations.

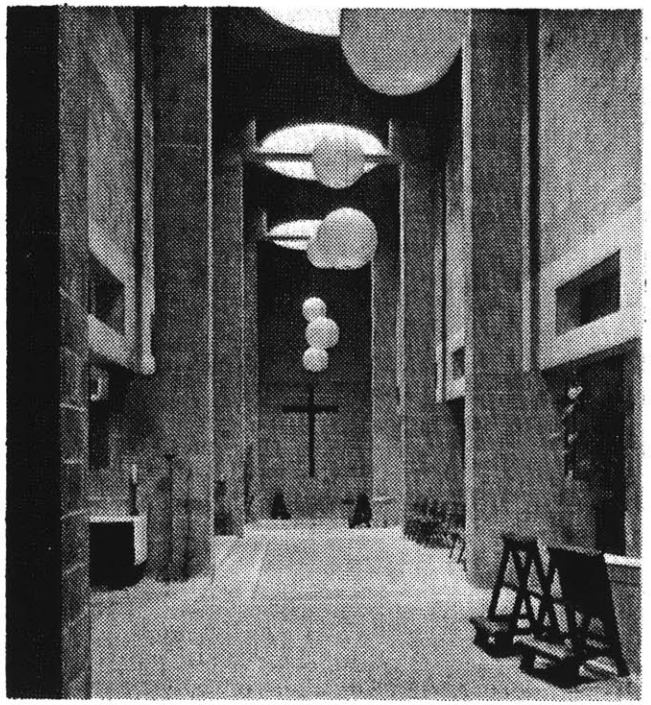


Example of lightwell/courtyard with access at 44 Brattle St., Cambridge, MA.

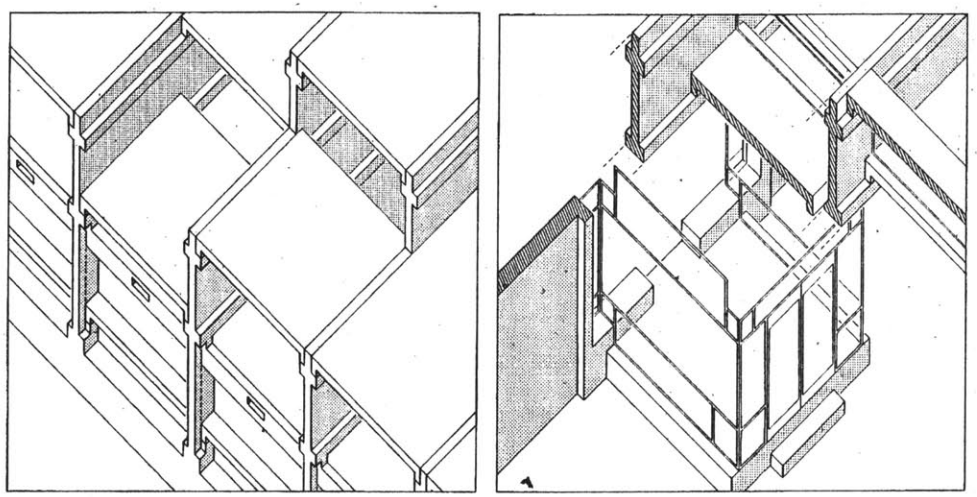
Lightwells of Central Baheer Office Building in Apledoorn by Herman Hertzberger 1967, 1972-70.



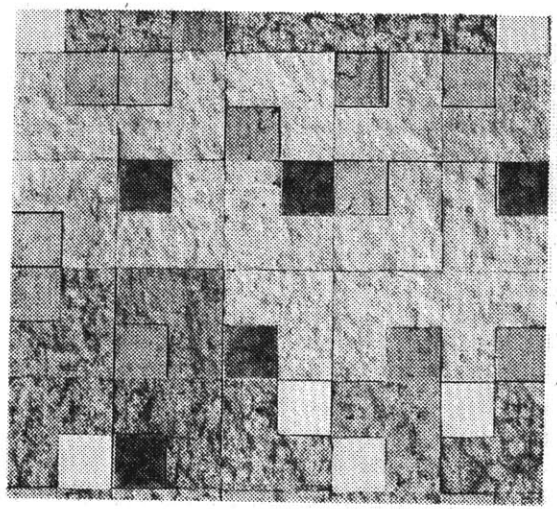
(Lightwells as spatial organizers) at Herman Hertzberger Montessori School in Delft, 1960, 1966-81.



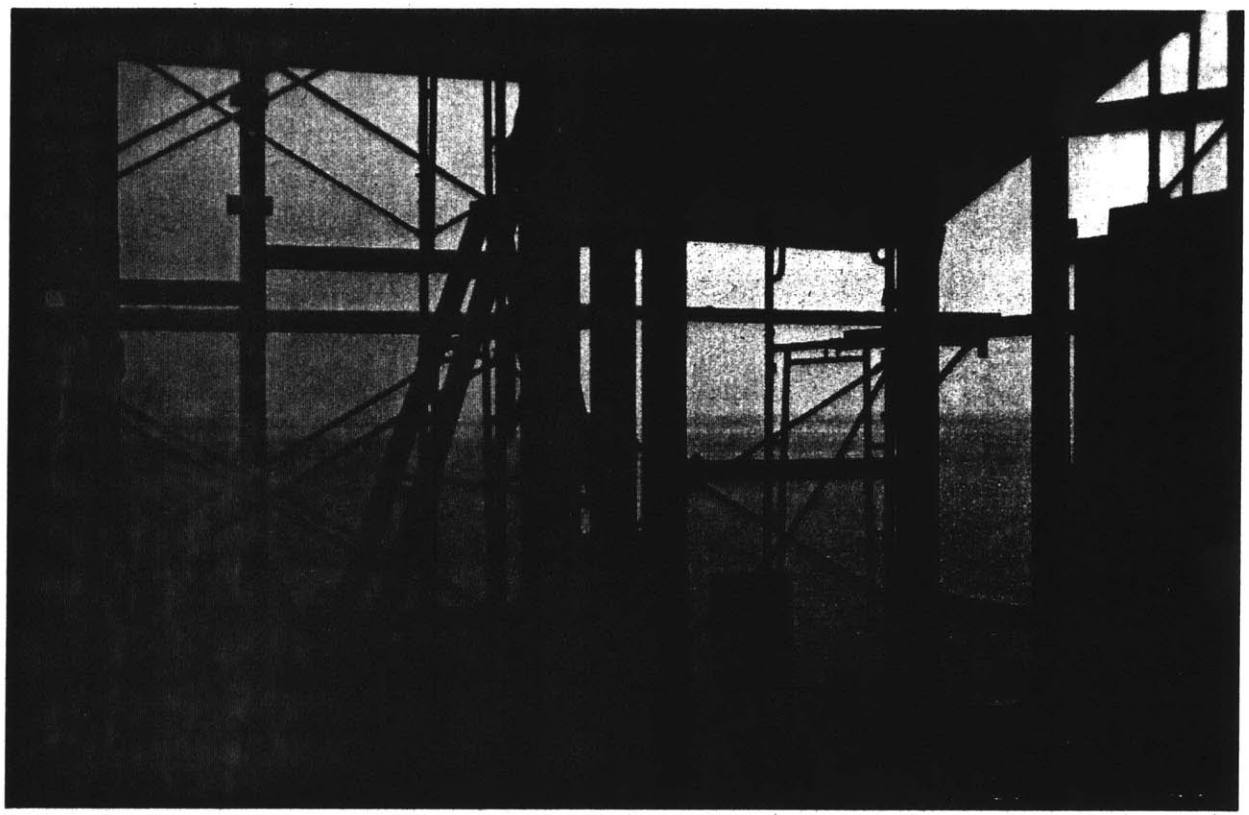
The Sacred Way, Roman Catholic Church, Den Haag, Netherlands, by Aldo Van Eyck. Structural detail of beam meeting supporting wall.



Isometric view of structural system of Lin Mij Factory Extension in Amstersdam Sloterdijk by Herman Herteberger, 1962, 1964.



Detail of external cladding of the Sacellum in the Castelvecchio Museum, Verona. Carlo Scarpa, 1965.



Blackman house in Manchester, MA, Maurice K. Smith, 1990-91. *(Screens as closure/partition system.)

STRUCTURE/CONSTRUCTION: Use directional spans to help suggest possible organizations and best accommodate getting light into the building.

Use tartan grid to set up range of sizes which might be used.

Use primary structure to establish larger sizes, including two story spaces which allow the placement of floors to be part of the secondary decision making process as well.

THE PROGRAM

The program of a building on the other hand seems to be a less substantial ground on which to base the design as the possibility of the life of the building outlasting the specific use is very likely and, under the tenants of this thesis, desirable. It has already been argued, however, that building a neutral framework as a method of avoiding this situation does not allow the building to actively participate in its use. In his description of designing what he calls "supports", Habraken explains that:

> maximum flexibility does not necessarily lead to the best solutions . . . The best support is probably not one that is neutral in its spatial suggestions. The support that offers specific kinds of space, which can be recognized, and evokes many different possibilities will be more successful.[1]

This implies that a space built for an uncertain/ non-specific use can still be 'designed' and formal decisions made.

In describing the use of "supports" and "detachable units" he states that "the design of supports must accommodate all possible detachable units, while all detachable units should be able to fit every support".[2] In this

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[1]N. J. Habraken, J. T. Boekholt, P. J. M. Dinjens and A. P. Thijssen, Variations: The Systematic Design of Supports, trans. by Wim Wiewel, ed. by Sue Gibbons, p.24.

[2]Ibid., p.22.

country, however, where there is no shortage of built territory, the choice of space can be/is as much a part of the decision of how to inhabit a space as removing and placing partition walls and furniture. Therefore a spaces does not have to be able to be all things to all people. It may be designed to be appropriate for some uses and not others. Certainly when one is designing for a client, they have a specific use/program in mind and building codes and zoning may also restrict or prescribe certain uses. While one need not limit one's design to a specific inhabitation or possibility, decisions can be made as to the scale of inhabitation (ie. shops v.s. department stores, small office v.s. corporation, studios v.s. four bedroom condominiums, etc.) and accessibility (private v.s. public). Therefore, while the design may not be program oriented, there will be some uses that will be more appropriate to the provided spaces than others.

Officially this site is zoned for an office building with parking. As it seems to be an important link in the built continuity of Massachusetts Avenue, however, perhaps the mixed use zoning of the larger street is more appropriate (and certainly more friendly to the explorations of this thesis). This somewhat mundane program is also a deliberate choice as more use specific buildings (libraries, museums, town halls, etc.) tend not to suffer from the shortcomings being discussed here as they are less directly linked to issues of economics and product.

"The poet's eye, in a fine frenzy rolling,

Doth glance from heaven to earth, from earth to heaven;

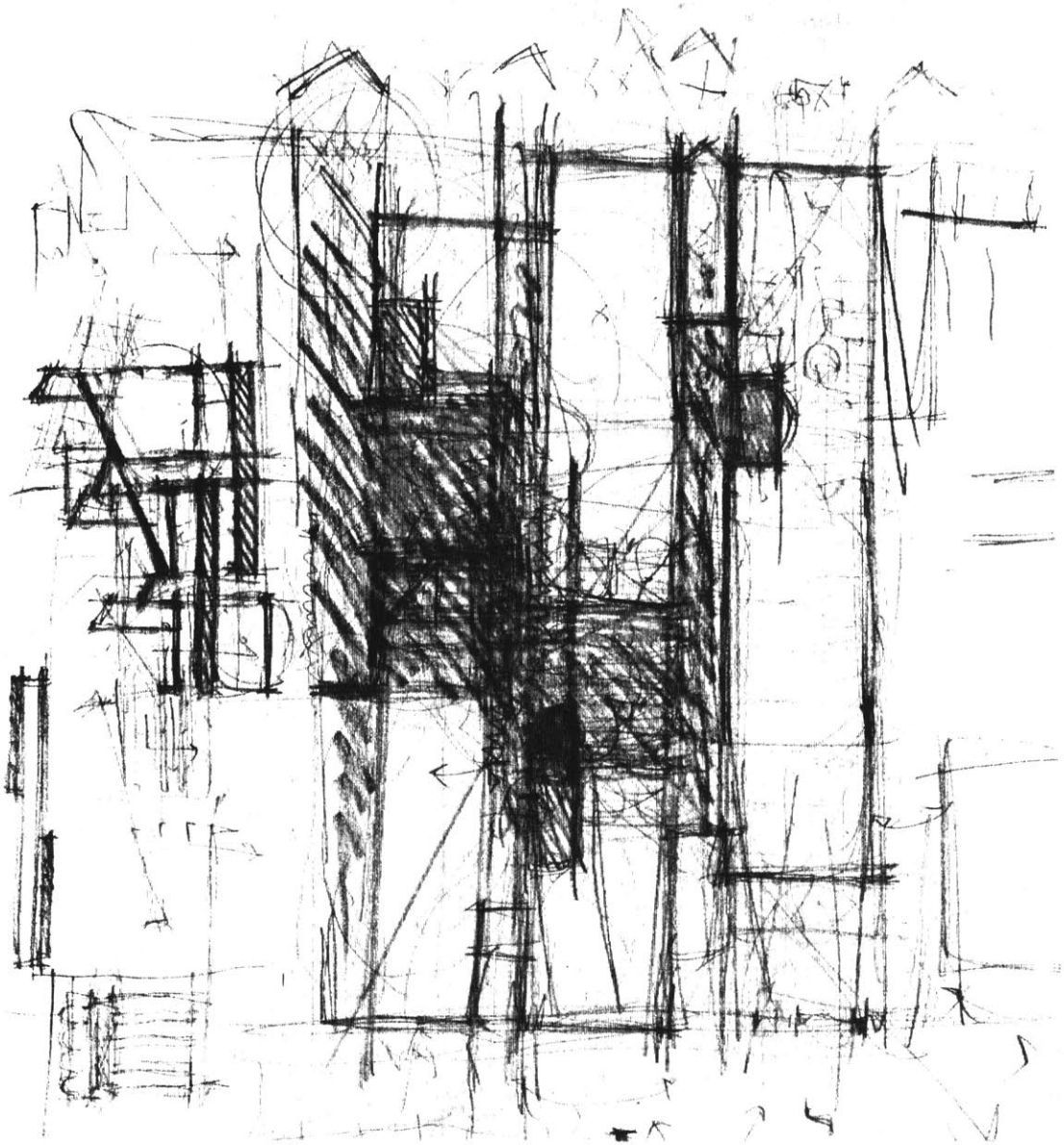
And as imagination bodies forth

The forms of things unknown, the poet's pen

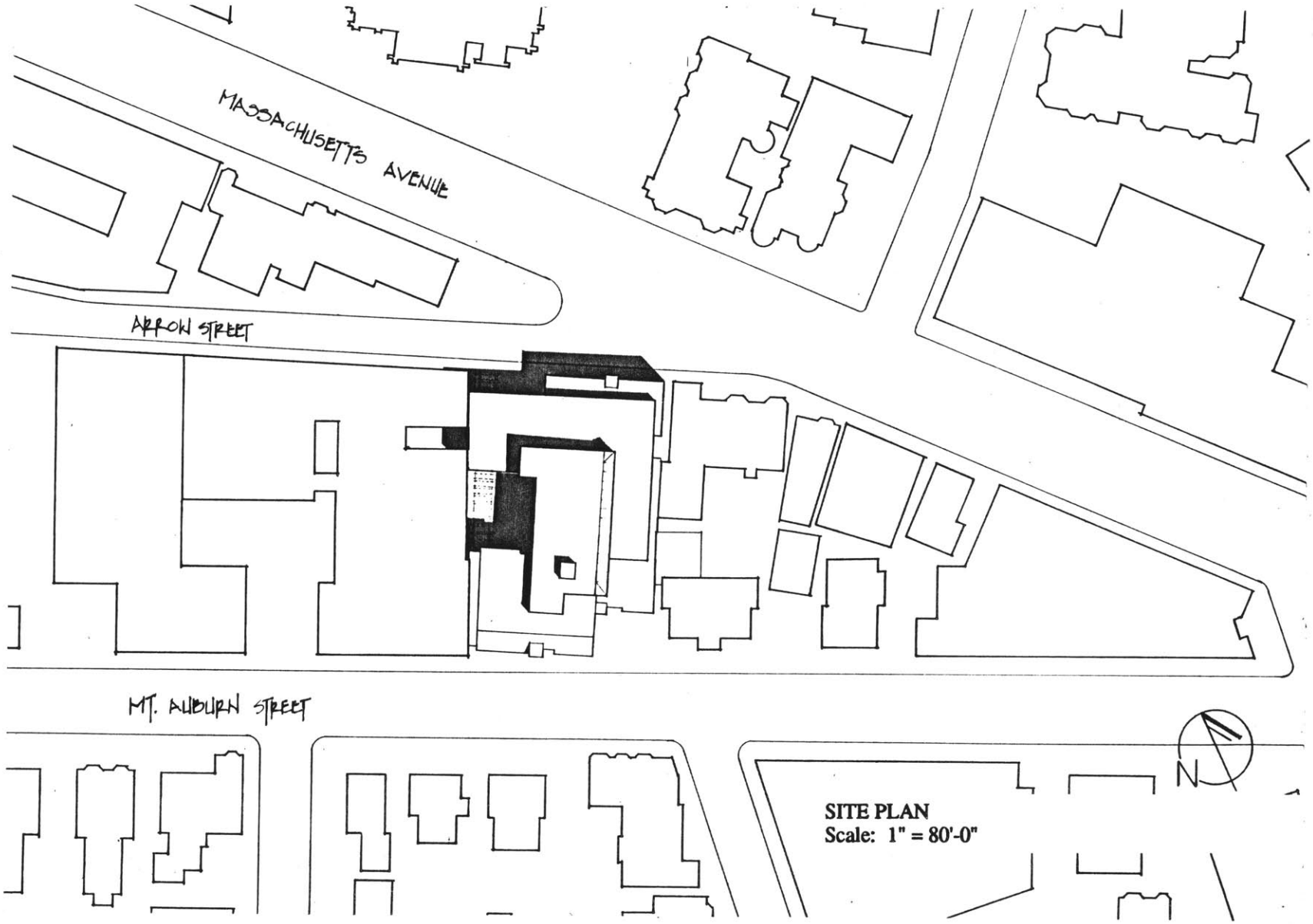
Turns them to shapes, and gives to airy nothing

A local habitation and a name."

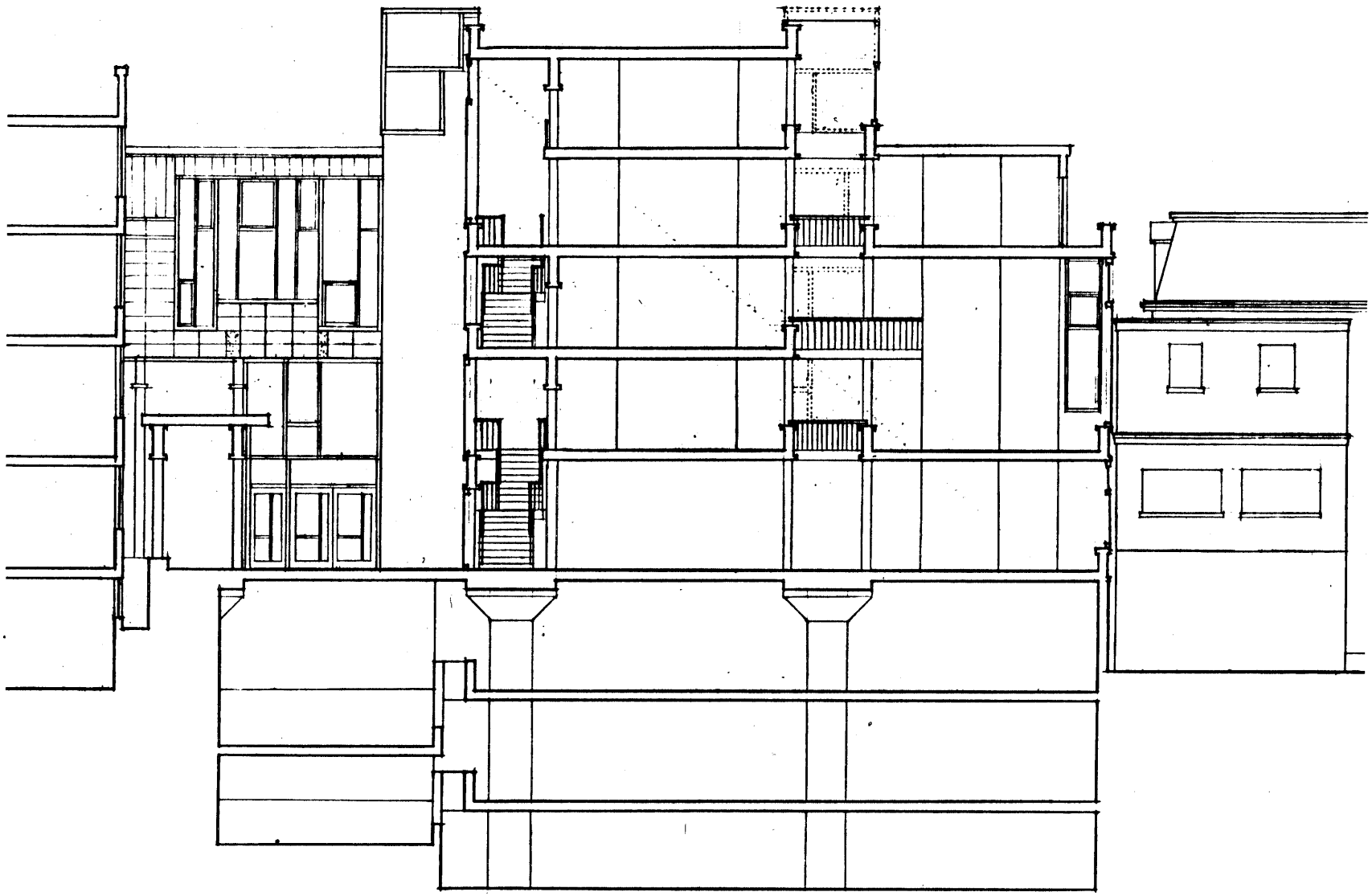
William Shakespeare, A Midsummer Night's Dream
Act V, scene 1, lines 12 - 18.



In the end the design efforts were focused on a few elements of the building rather than on trying to design every system down to the last detail. The design of the secondary system was eliminated from this exercise as it appeared to be the least durable of the structural/construction systems and the system with which an inhabitant was most likely to intervene. While sizes and suggestions for access and use zones were indicated by the dimensions and forms of the primary, mechanical, and closure systems, the final decisions are left to the occupant as in any speculation building. This means the main focus of the design was the primary structure, the vertical organizers, and the elevations / closure. Making these moves as site responsive as possible, without being too specific and therefore too confining, or too neutral and therefor reducing the building's impact and contribution to the existing context, was the main goal in this design.

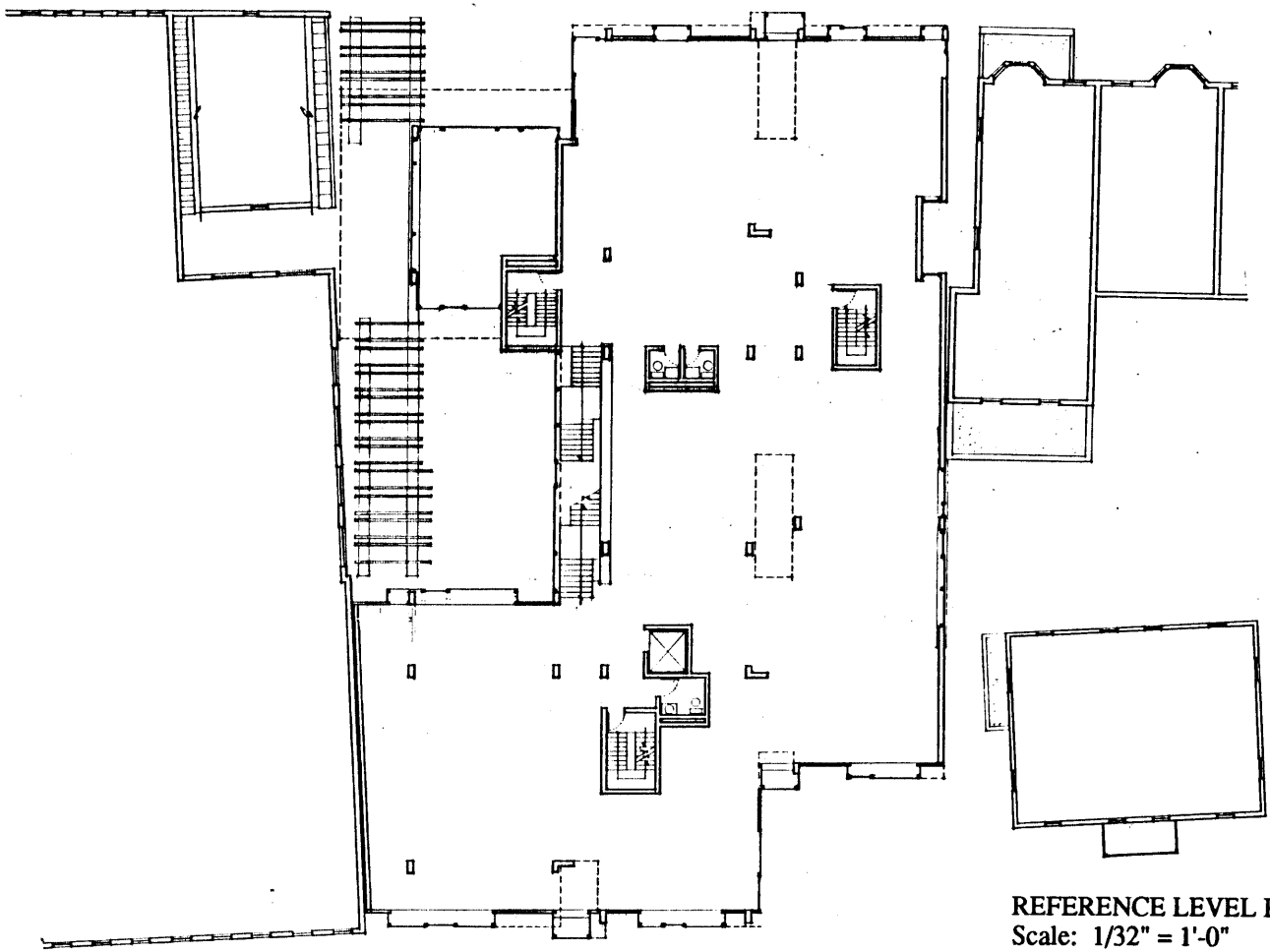


SITE PLAN
Scale: 1" = 80'-0"

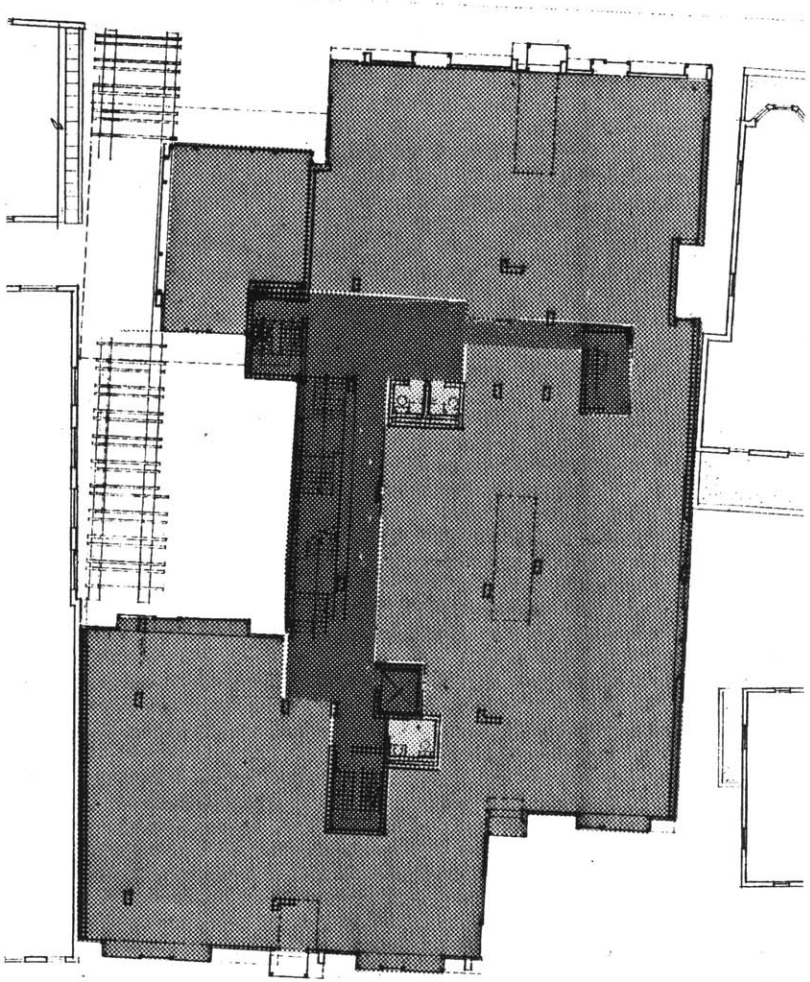


CROSS SECTION THROUGH COURTYARD,
LOOKING TOWARD MASSACHUSETTS AVE.

Scale: 1/16" = 1'-0"



REFERENCE LEVEL PLAN
Scale: 1/32" = 1'-0"



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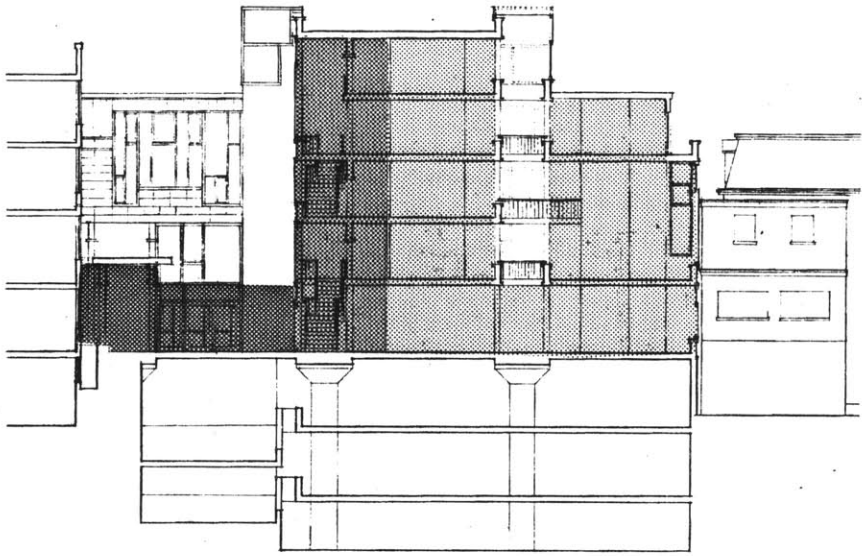


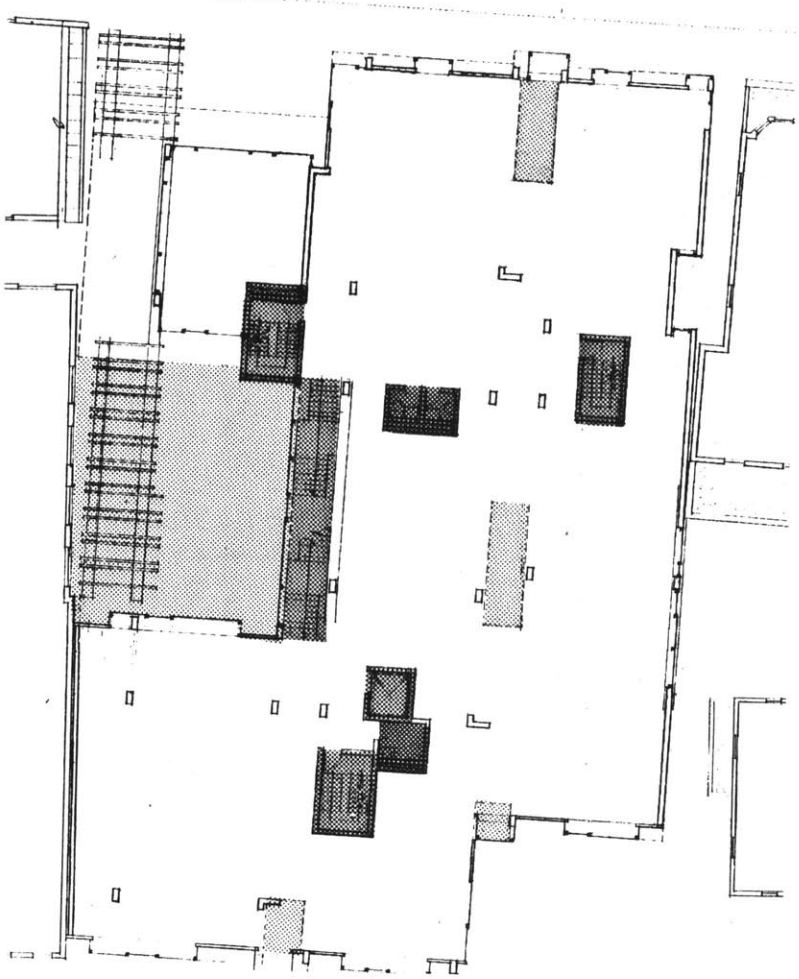
CROSS SECTION THROUGH COURTYARD

ACCESS DIAGRAMS: "0" ARROW ST.

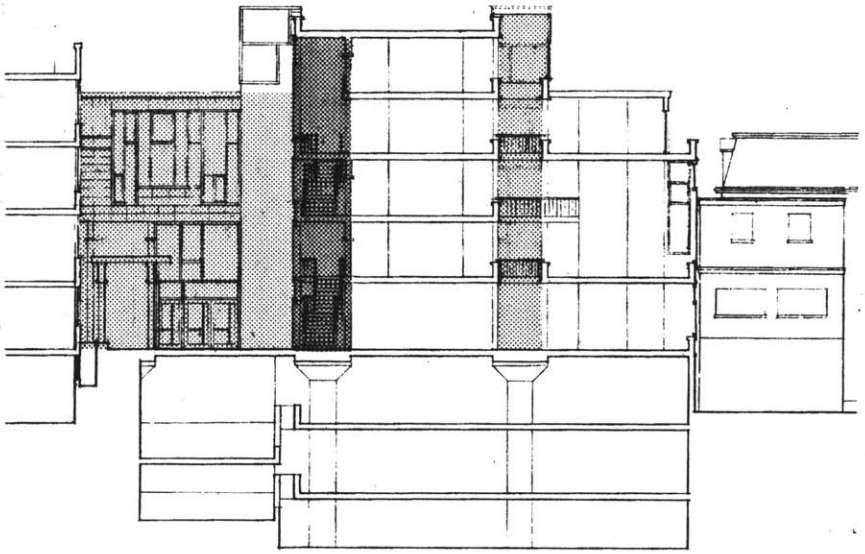
- public

- semi public

- privacy



REFERENCE LEVEL PLAN

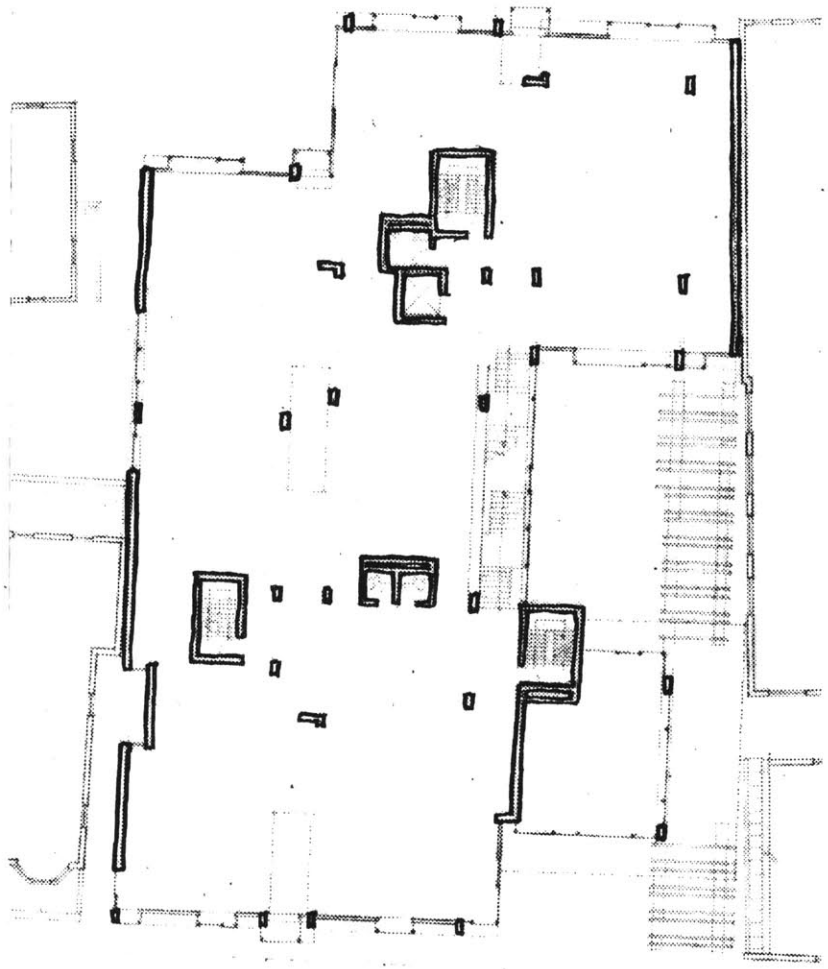


CROSS SECTION THROUGH COURTYARD

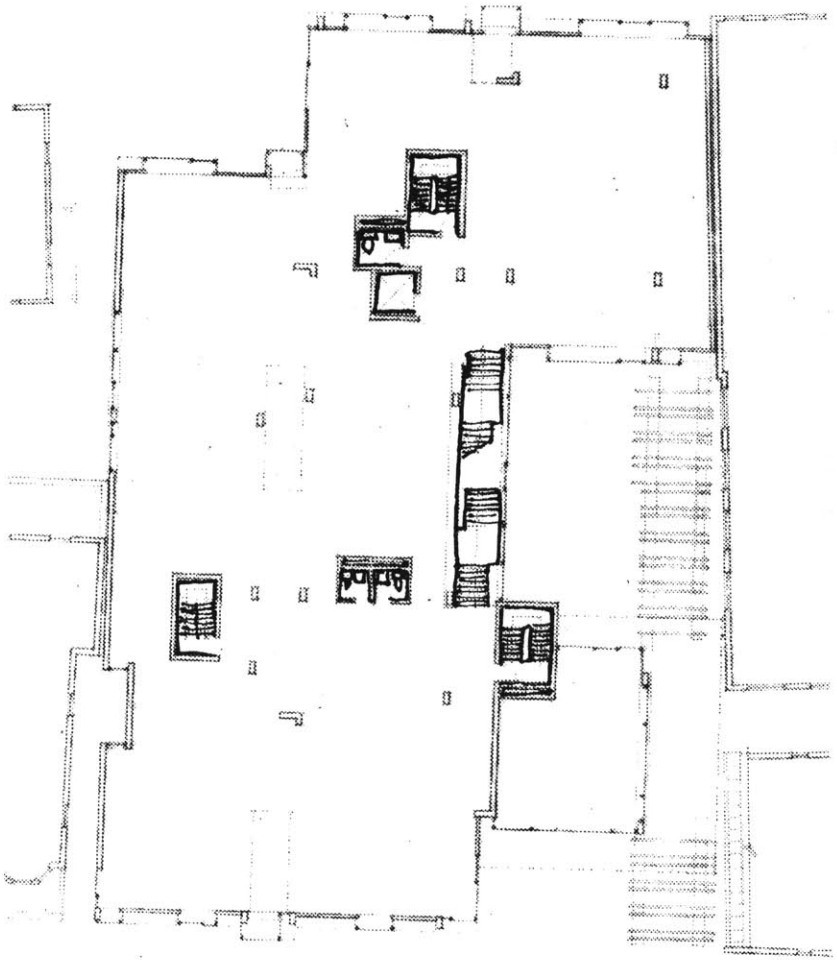
SPATIAL DIAGRAMS: "0" ARROW ST.

- lightwell/courtyard
- vertical access
- mechanical stacks

STRUCTURAL DIAGRAMS: "0" ARROW ST.
Scale: 1/32" = 1'- 0"
(Secondary excluded because not considered durable).

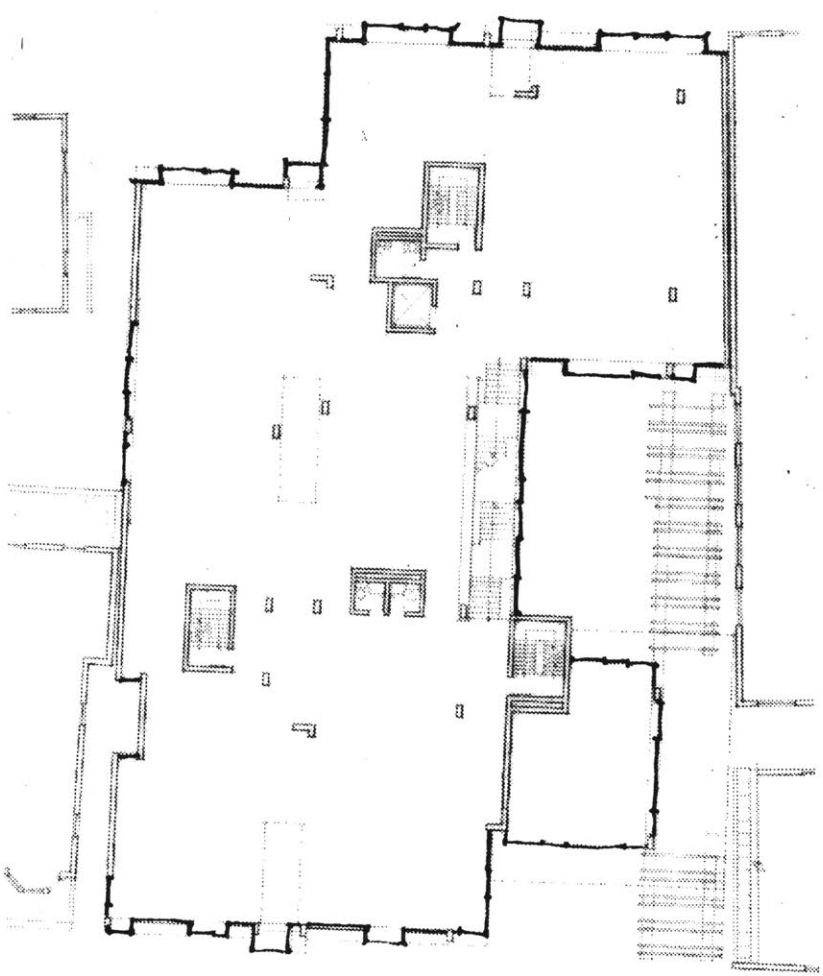


REFERENCE LEVEL PLAN



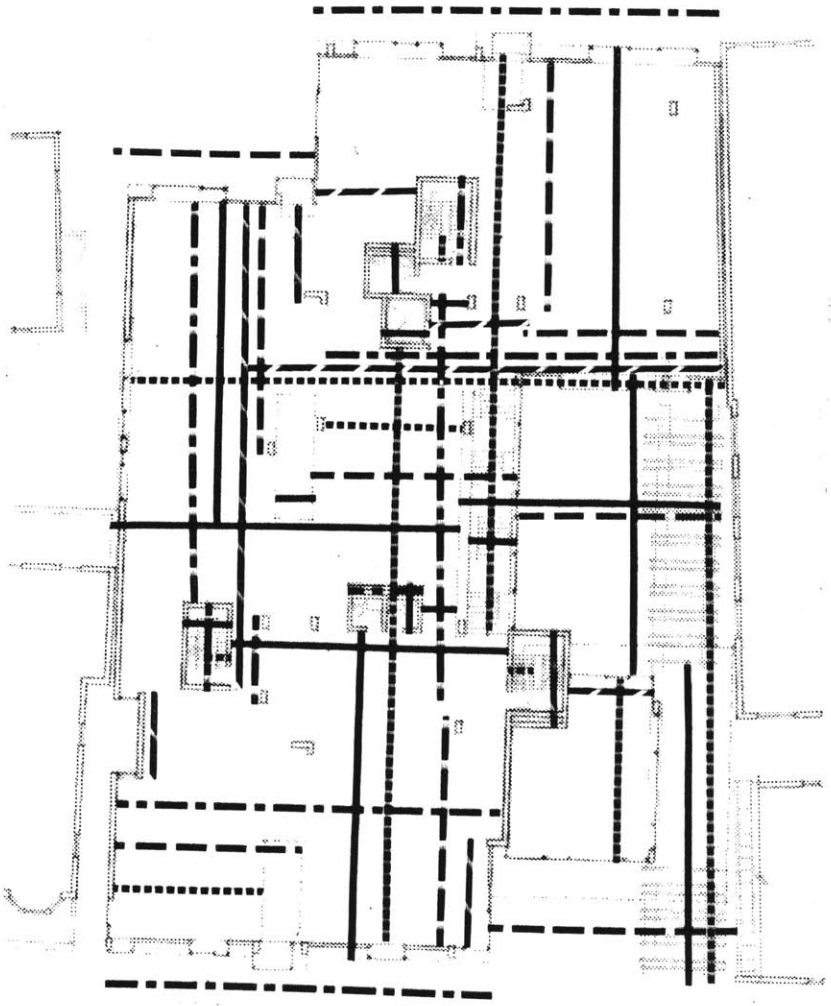
REFERENCE LEVEL PLAN

Mechanical System



REFERENCE LEVEL PLAN

Closure System



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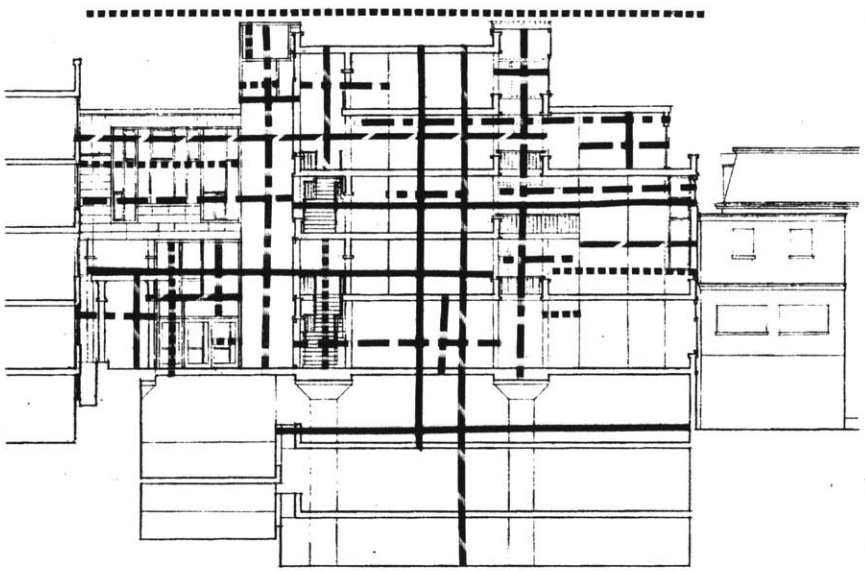
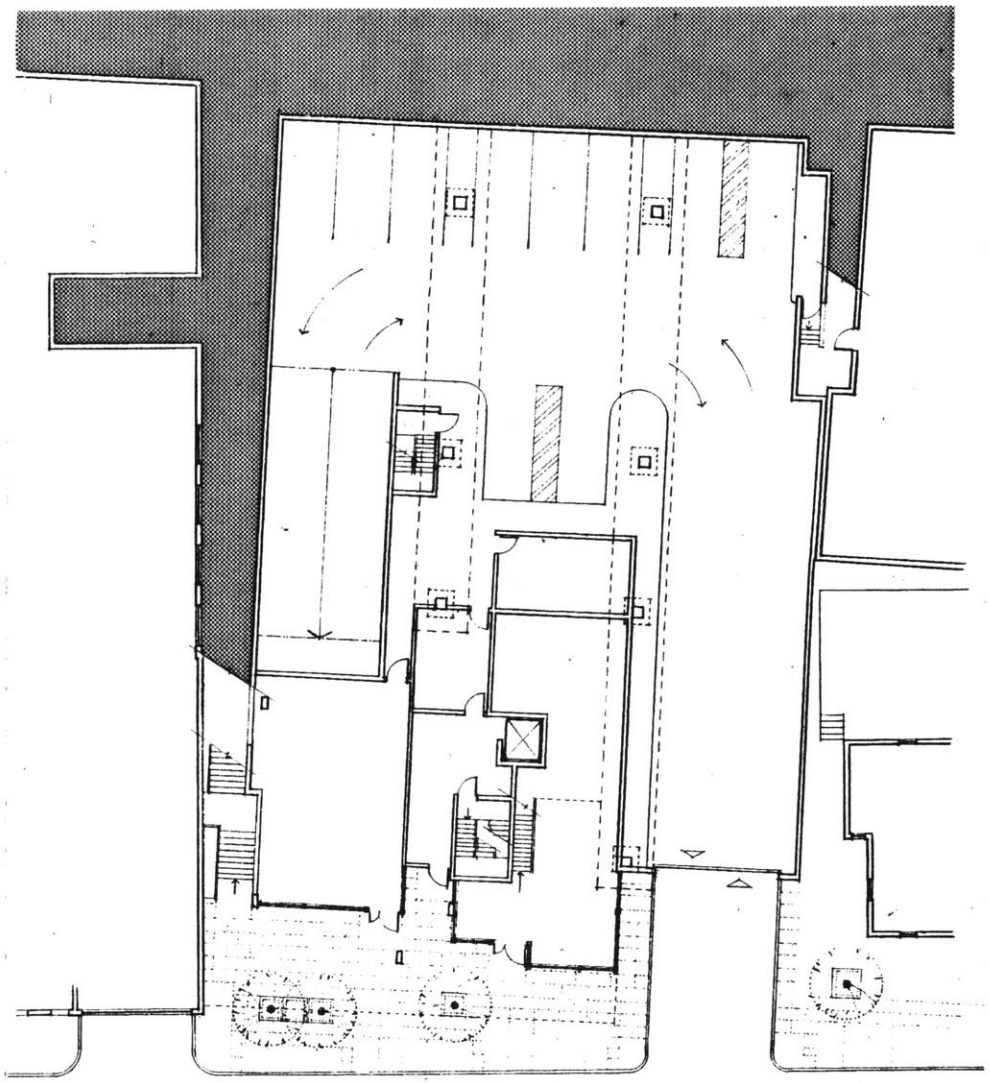


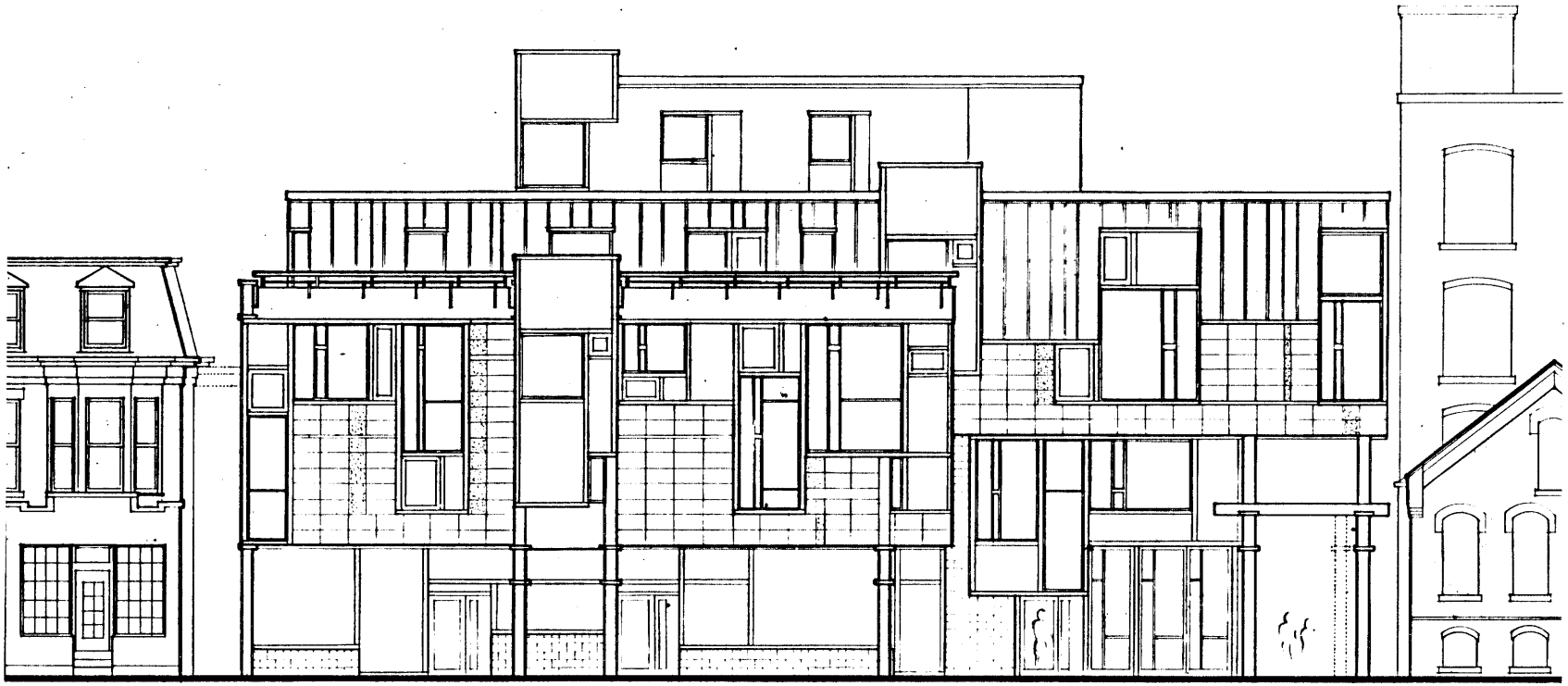
CROSS SECTION THROUGH COURTYARD

DIMENSIONAL DIAGRAMS: "0" ARROW ST.
Scale: 1/32" = 1'- 0"

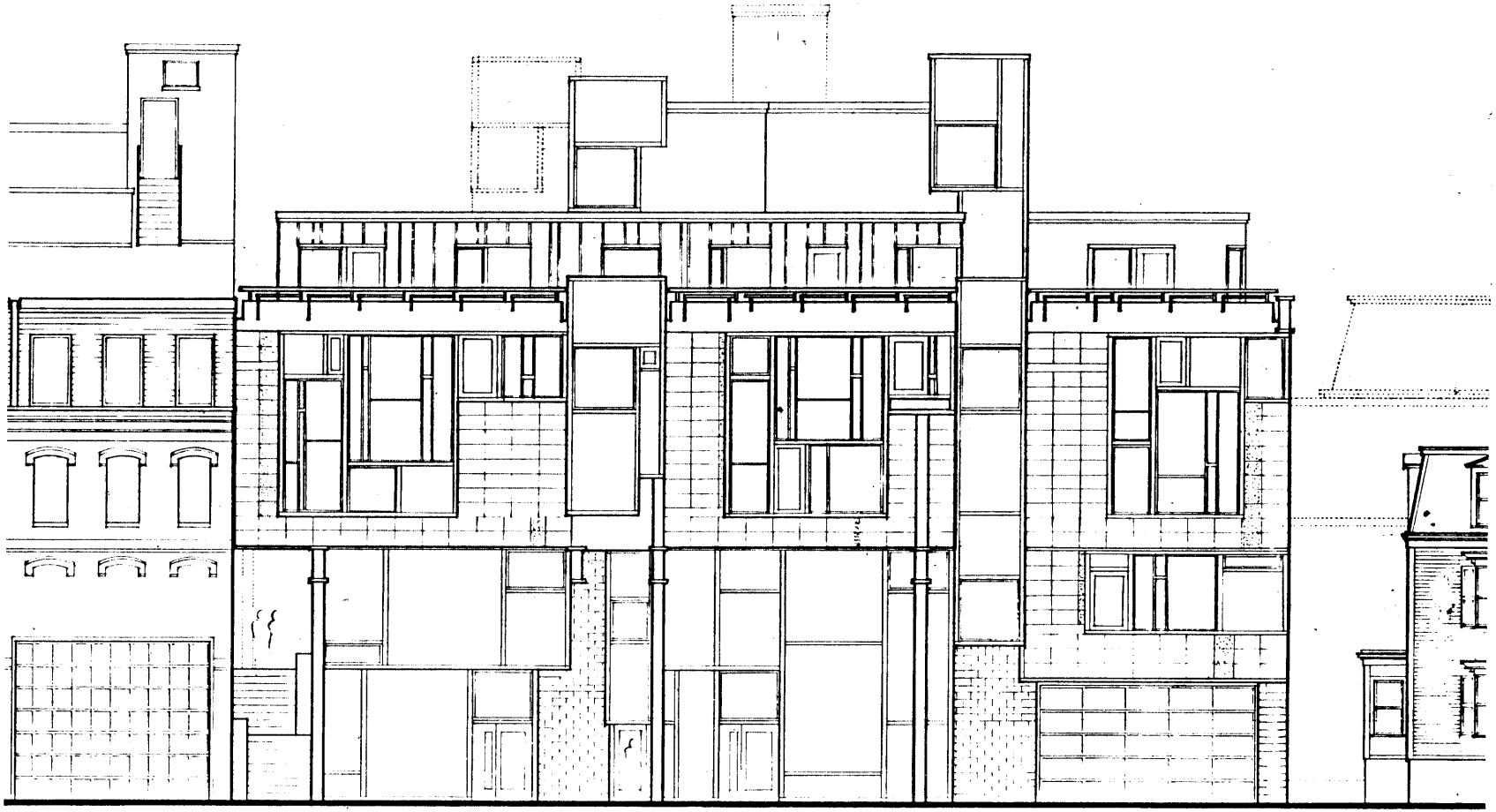
small site dimension
max length of building access
building size access
size of larger collective
bay width and light well
large room (use and access)
room size
min use/"size" of light
access



PLAN @ LEVEL OF MT. AUBURN STREET
Scale: 1/32"= 1'- 0"



MASSACHUSETTS AVE. ELEVATION
Scale: 1/16" = 1'-0"



MT. AUBURN ST. ELEVATION
Scale: 1/16" = 1'-0"

"The decision maker has a choice between optimal decisions for an imaginary simplified world or decisions that are "good enough", that satisfice, for a world approximating the complex real one more closely."

Herbert Simon, The Sciences of the Artificial


Charles
& Co.

This thesis came about out of an interest in how architecture records the passage of time.

It has lead to an exploration of what the more permanent elements of a building are in order to better focus our efforts on "designing the hell out of them" as they will be the record for the next layer to refer to.

Perhaps many of the issues are less glamorous than one might hope and in the end the developers have the right idea that the money and effort should be invested in the public transitions, the plumbing, and the exterior as the rest is likely to be altered sooner or later and therefore is not worth investing in for any long term concerns. This was discouraging news, at first, as the design became simpler and simpler and began to resemble more and more the kind of architecture that had started the whole discussion in the first place. The world was doomed to a culture of borrowed iconic references and minimally defined spaces.

However, upon returning to the buildings that had been used as references, it became clear that they were hardly highly complex and specific in form. What had made them unique was their response, with the building methods current to their time, to the specific conditions of the site at the levels which were within their realm of control. Had they been specific and overly particular to a use, they would have been just as temporary as the neutral spaces, if not more so, as they would have had to

be torn down rather than simply covered over as the next intervention was made (baring rescue for reasons of historical preservation).

Somewhere between these two extremes there exists a generic (for lack of a happier term) architecture which is simple enough to allow multiple interpretations as time passes and uses, demand and technologies change while still providing enough definition to maintain the building as a constant and contributing member of an on going built context. By making the more permanent interventions as responsive to the site and the available technologies as possible, it is still possible to generate architecture that encourages evaluation, interpretation and innovation and not just the commodity of space.

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